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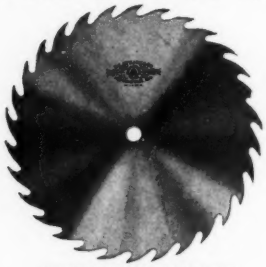

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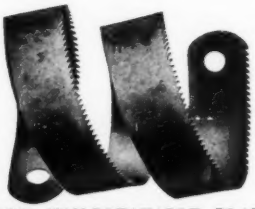

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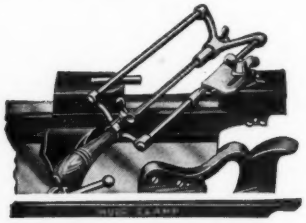

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THE WESTERN ARTS CONVENTION

April 30 to May 3 are the days to be reserved for attendance at the thirty-fifth annual convention of the Western Arts Association, which will be held at Cleveland, Ohio. The program which has been arranged for you, is on page 205 of this issue.

YOUR REQUISITIONS

In this issue of the INDUSTRIAL-ARTS MAGAZINE, we want to call your attention to the ordering of your equipment and supplies for next year. This is an annually recurring task and takes time if it is to be done properly. Deliveries made under pressure are usually not satisfactory and are apt to be more costly. Therefore allow yourself time to properly study your needs, requisition them, receive them, and properly install or store them.

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(The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature," "Education Index," and "Current Magazine Contents."

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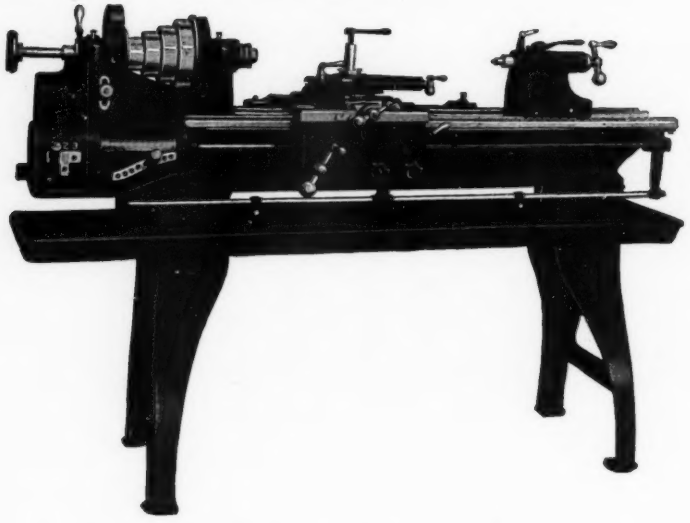
STAR LATHES



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THE INDUSTRIAL-ARTS MAGAZINE

Volume XVIII MAY, 1929 No. 5

The Equipment and Organization of a General Metal Shop

W. A. Stone and George Knoblauch, West Allis Public Schools, West Allis, Wis.

ALMOST coincidental with the advent of the junior high school there came into being a number of courses of study characterized by the word "general." It was about ten or more years ago that the first "general" appeared on the scene; and, since then we have seen a veritable parade of "generals" passing in review. We have general science, general mathematics, general language, general metal, general shop, etc.

The main objective of these general courses seems to be to furnish to the pupil a wide variety of typical contacts or experiences within a given field, with the hope that these contacts and experiences may help the child to discover his own interests, aptitudes, and abilities with respect to that field. Whether or not these general courses are so organized and so taught as to attain what is claimed to be their main objective is not within the province of this article to discuss. Until some method of evaluating general courses is devised, we will assume that they contain worth-while material that has values exclusive of the guidance values. We propose here to deal with one of the problems that confronts industrial-arts teachers who attempt to organize and conduct a general-shop course; viz., the problem of organizing and equipping a *general metal shop*.

Before proceeding with a discussion of the problem of equipping a general metal shop, it might be well to define the term "general" as applied to industrial-arts courses. As we see it, a general-shop course is one which offers to the boy samplings of several different industrial occupations either within a certain delimited field or within several different fields. For example, the general-shop course might include samplings of carpentry, forging, sheet metal, electricity, auto mechanics, etc. Again, the field might be narrowed down to include samplings of metal-working occupations, building trades or printing trades. The discussion in this article will deal with the latter type of a general-shop course; viz., a general metal course.

Accepting this definition of a general-shop course, it will naturally follow that a general metal course must

AN 8B GENERAL METAL CLASS AT WORK

be a course which will include samplings of the most common metal-working occupations. It naturally follows also, that the course must be so organized and the shop so equipped that the boy will receive contacts with the most common processes and operations of the occupation and with the most common machines and tools used by men who earn their living in that occupation.

Hence, any school that attempts to introduce a general-shop course, must inevitably face the problem of equipping and organizing a shop to carry on the work; and anyone who has attempted to work out this problem knows that it is not one of the lesser problems connected with the introduction of a general-shop course into the curriculum.

The writers of this article do not propose to work out a formula by which one can solve all of the problems connected with the equipping of a general shop. All we hope to do is to set up a few guide posts with the hope that they may be an aid to others who wish to leave the beaten paths and explore new trails. We shall simply narrate our own experience and show how we solve our problems as they confronted us. We shall set up certain guiding principles which we have deduced from our experiences and attempt to show how these principles have been applied in the equipping of a general metal shop in a junior-senior high school with an enrollment of about 1,500.

Before stating the principles which we feel should guide one in equipping a general shop, let it again be said that they are not a formula and are stated with no idea of finality. We only hope that, if followed through, they may help someone else "over the hump."

Briefly stated, the guides to the equipping of a general shop are as follows:

1. Determine the units that are to be included in the general-shop course.
2. Determine what type of a class organization is to be followed .
3. Make plans to use the space and equipment already available.
4. Add new equipment to accommodate classes of the size that one is apt to be required to teach.

The determination of the units to be included in the course is naturally connected more with the laying out of a course of study than with equipment of a shop. However, the shop cannot be equipped, until this part of the job is done; and we shall discuss this point only in respect to its relation to equipment.

The determination of the units to be included in a general-shop course is to a large extent a local problem but the broader aspects cannot be neglected. For example, in a small school in a rural community one might find it desirable to include units in carpentry, forging, auto mechanics, electricity, etc. In an urban community some of these units might be desirable, some undesirable, and still others included. In any case the units included in the course must have some other justification than merely the snap judgment of the teacher; and the teacher must be prepared to "sell" his course to the board of education when he asks for new equipment.

In the particular case under consideration the supervisor assigned to one of the writers of this article the task of writing a course of study and to the other the task of arranging the available shop space and making requisition for such new equipment as was found necessary. Naturally the major portion of the first task had to be completed before the second one could be accomplished, but a large portion of the accomplishment of the two tasks necessarily had to proceed simultaneously.

We seemed to have ample justification for a course in general metal in the fact that the school is located in an industrial suburb of the city of Milwaukee and also in the fact that about 55 per cent of the fathers of the pupils attending the school are skilled tradesmen. Statistics also showed that nearly 67 per cent of the industrial workers in the metropolitan district are engaged in the metal-working occupations.

So much for the local aspects of the situation. Looking further we looked into the report of the U. S. Census Bureau, 1920, to see if it were possible to determine the most important metal-working occupations, with a view toward including samplings of these in the course of study. The following list of ten occupations was made and ranked in order of their importance from the standpoint of the number of people employed:

Name of Trade or Occupation	*Number of Males Ten Years of Age Employed*
1. Machinists	894,622
2. Blacksmiths, forgemen, hammer men	221,427
3. Electricians	212,964
4. Plumbers and gas and steam fitters	206,718
5. Molders, founders, and casters	123,681
6. Iron and steel industries (rolling mills, etc.)	79,613
7. Tin smiths and copper smiths	74,986
8. Boiler makers	74,055
9. Filers, grinders and buffers	59,785
10. Furnace men, smelters, heaters, pourers	40,806

Electricians should not rightfully be included in a list of metal-working occupations as it is to a large extent a building-trades occupation. The same could be said of plumbers. They were included only because it had been found that most schools have included units in electrical and plumbing work in general-metal courses. However, we decided to eliminate them from our list on the above mentioned grounds. Sheet-metal work has two distinct branches or fields, the building-trades field and the metal-trades field. In view of these facts, and also in view of the fact that we already had sheet-metal equipment, we decided to include a sheet-metal unit in the course.

Without going further into the process of elimination that was followed the units finally decided upon were two units in machine shop (lathe and benchwork) and one unit each in molding, forging, and sheet metal. One unit was also included that involved no shopwork, but covers general information as related to the metal-working field, such as a study of the most common metals and their properties, the mining and refining of iron ore, methods of making steel, and a general view of opportunities for employment in the metal trades.

We found, however, that the determining of the units to be included in the course of study did not give sufficient basis for making a list of equipment. It now became necessary to consider the second point mentioned in the foregoing, namely, the determining of the type of class organization to be followed.

In solving this problem we were willing to be guided by the experience of others. An examination of bulletins and courses of study from other schools revealed the fact that there are two distinct types of general-shop courses: First, the unit-shop type, and second, the general-shop type. We also found that in the first type the entire class proceeded from one shop to another, receiving a few weeks' contacts in each shop. In the general shops we found two practices in existence. First, the entire class proceeds from one unit to another within one shop, and second, the class is divided into groups and work proceeds in all units simultaneously. After a certain period each group proceeds to a new unit and so on through the semester until the entire class has covered all units in the course.

The latter type of class procedure is common in general-shop courses, but we did not find it to exist in a general metal course. The usual custom in general metal shops seems to be to follow the single activity procedure. In one case we found an entire course built around one project. We will leave it to the reader to decide whether or not this could rightfully be called a *general* metal course.

There seemed to be so many points in favor of the varied activity type of class organization that we decided to attempt to apply it to a general metal shop. This conclusion was based on the following reasons:

a) For the five units of work it would require only one fifth of the equipment that would be required for a single activity class.

b) All of the equipment would be in constant use. There seems to be no justification for conducting a class in such a manner that four fifths of the equipment would be idle four fifths of the time.

c) The available space would permit the handling of classes four or five times as large, or at the very best, twice as large, as could be handled in a single activity class.

The last point just mentioned naturally brings us to our last two main points of consideration—making use of available space and equipment and adding new equipment to accommodate the classes we would be expected to handle.

For about seven years previous we had been conducting machine-shop classes in grade ten in a shop 23 by 60 ft. The shop was at that time equipped with the following machines:

Two 12 in. by 5-ft. lathes, belt driven.
One 14 in. by 6-ft. lathe, belt driven.
Two 12 in. by 6-ft. motor head lathes.
One 20-in. drill press.
One 12-in. bench drill.
One No. 1B milling machine.
One 14-in. shaper.
One 7-in. shaper.
One 10-in. grinder.
One No. 1 universal grinder.
One 12-in. power hack saw.

We also had sufficient equipment in tools such as drills, taps, and dies, reamers, calipers, tool holders, combination squares, etc., to accommodate machine-shop classes of from 12 to 15. The machine-shop equipment therefore seemed to be adequate for the new course we were to introduce.

The following list was also added to accommodate the bench machine-shop work:

Six 8-in. hack-saw frames.
Six 4-in. combination squares.
Six 4-in. pocket scribers.
Six file cards and brushes.

In addition to this we had been conducting in another shop, sheet-metal classes of 20 or 25 boys in grade 7A. It seemed unnecessary to requisition new sheet-metal equipment. For lack of space a detailed list will not be given here, but it includes the ordinary sheet-metal machines, such as burring, turning, wiring, beading, and setting-down machines and a sufficient number of bench stakes and hand tools.

A survey of the floor space seemed to indicate that, by a rearrangement of the machines and the toolroom, we would be able to move the sheet-metal equipment into the machine shop and still have ample space to install equipment for molding and forge work. Figure 1 shows the old arrangement of the shop, and Figure 2, the new. Under the old arrangement the shop had been accommodating at the most, 40 boys a day in machine-shop classes. By the addition of two 9 in. by 4-ft. lathes it was now found possible to accommodate not only the machine-shop classes in a fewer number of periods, but in addition at least 120 8B boys in general metal classes.

Our last point for consideration was to make out a list of equipment for carrying on work in molding and forging.

The cost of instruction in industrial arts has of late forced the industrial-arts teachers to handle classes much larger than they formerly thought it possible to handle. We were informed that we must expect classes of 30 to 35 to report to us the next fall. The prospect was not pleasing, but we proceeded to make our equipment requisitions on that basis. A class of 30 meant equipment in forging and molding for 6 boys at one time. The following list of equipment was requisitioned and purchased:

Forging

Six 10-in. anvils.
Six 2-lb. cross-peen engineers' hammers.
Six 18-in. straight-lipped blacksmith's tongs.
Six bench furnaces.
Four hardies.
One hot chisel.

Molding

Six 12-in. snap flasks with bottom boards.
Six hand rammers.
Six 6-in. smoothing trowels.
6 sets of 6 each assorted slicks and spoons.
Six draw pins.
Six molders, wire brushes.
Six swabs.
Six each No. 10 and No. 12 riddles.

After the course had been given for one semester, it became apparent that the 20-in. drill press and the bench drill were not adequate to meet the demands of the classes. It became necessary, therefore, to add a 16-in. sensitive drill press. The location of this machine is shown in Figure 2. Perhaps no equipment list can be made out in advance that will exactly meet the actual demands. New equipment can be added as the need arises, but to overequip means that some equipment will lie idle. For instance, it was found that it was impossible for a boy to finish a mold in the allotted 50 minutes. It was not feasible to leave the mold to be

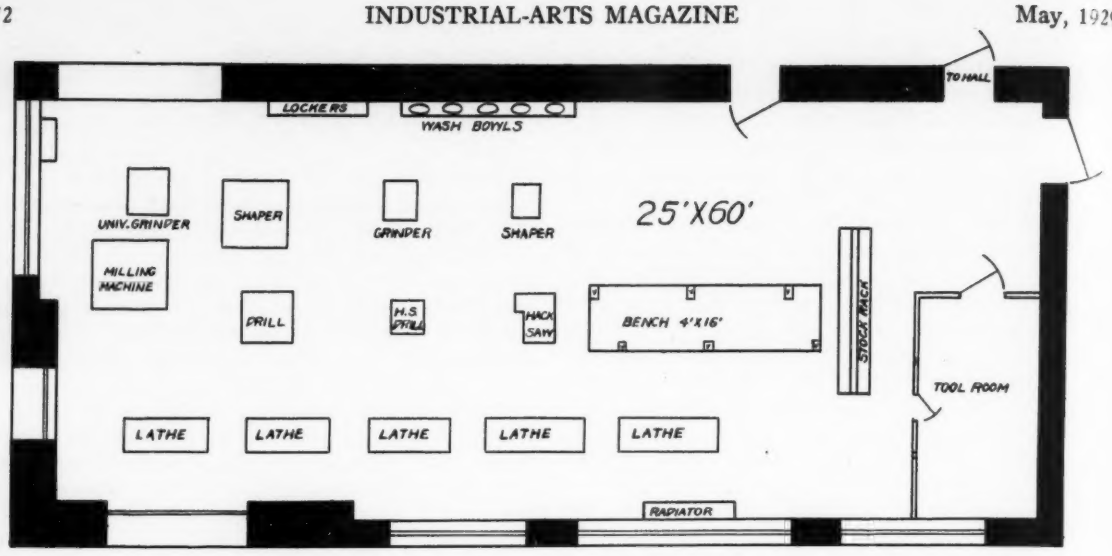


FIG. 1. THE MACHINE SHOP BEFORE IT WAS CONVERTED INTO A GENERAL METAL SHOP

finished the next day so two boys were assigned to work together on one mold. Thus it became apparent that we could get along with one half of the molding equipment we had on hand. For this reason some of it was transferred to another school.

The shop has now been in use nearly two years. Both of the authors of this article have taught classes that have contained as many as 35 eighth-grade boys. Only the proper equipment and organization of the school have made it possible.

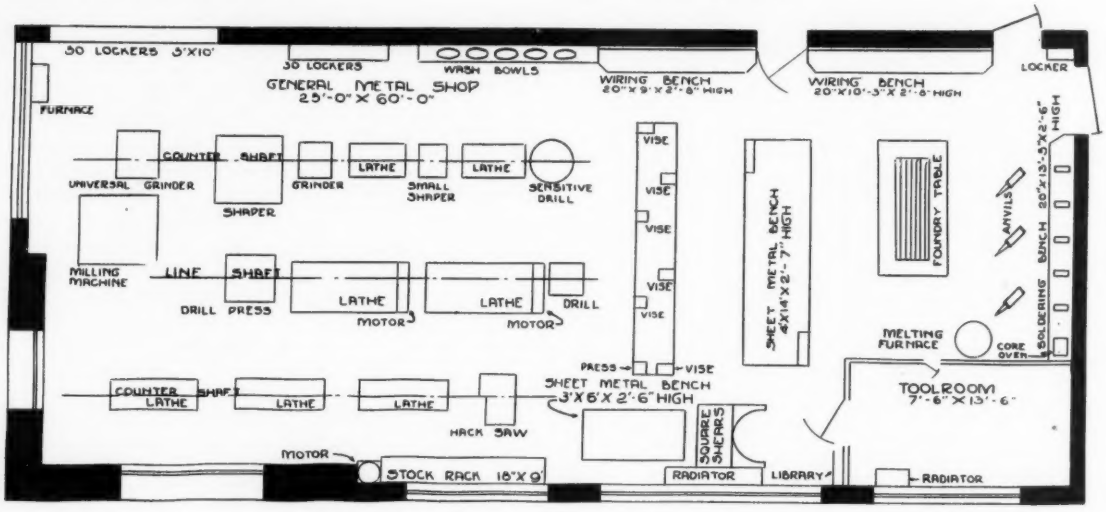


FIG. 2. THE PRESENT GENERAL METAL SHOP

Drafting-Room Management and Control

T. A. Hippaka, Supervisor of Industrial Education, Madison, Wis.

PART III (Conclusion)

Choosing the Subject Matter

The preparation of suitable subject matter offers an important as well as a difficult problem. It is discussed here under two heads, namely, selection and organization.

Because of the vast amount of available material, the selection of subject matter becomes one of laborious extraction and of discarding. Texts, reference materials, and current magazine articles are very plentiful. The best and most applicable matter should be taken from such sources and combined with the latest and best practices employed in modern industry. It is a wise plan to take the methods advocated in the latest written works and compare them with the practices employed in the commercial field. Of course, it is necessary for a teacher to visit factories and drafting rooms to secure first-hand information for himself. Obsolete methods are too often employed by teachers who do not have connections with the industrial field. It is quite possible to analyze the requirements for a certain type of drawing work and to select materials so that they will aid the boy to meet

required standards. It is very helpful too, to obtain courses from other schools for the purpose of comparison and investigation. Whenever the teacher attends a large gathering of his fellow workers, it is well for him to discuss his problems with others who are teaching the same subject. Taking these various factors into account when attacking the problem of selecting materials, assist greatly in planning the right kind of teaching material.

Hand in hand with the selection of materials comes the organization of subject matter. Frequently the teacher is a member of the curriculum-construction committee where everyone has an opportunity to participate. Reactions are secured from every committee member and the teacher takes due cognizance of such suggestions as he goes to work on the problem. The course is then carefully outlined using such materials as are deemed essential and useful. Some definite objectives are formulated first. Then come such considerations as time, grade in which the course is to be offered, scholastic proficiency and mental ability of the people who will take the course. As each subcommittee reports to the entire group with a completed piece of work it is again discussed from every possible angle and the necessary changes made. Such courses are then printed with the understanding that they are tentative and are issued to others for their helpful criticism and suggestion. The process is a continuous one, for the progressive teacher is always on the alert for the best ideas, and is continuously incorporating them into his work.

The presentation of subject matter will be considered under eight headings; namely, the demonstration, the lecture, the discussion, the review, individual instruction, instruction sheets, reference materials, and visual aids. All are teaching devices that must be used in order to obtain the best results.

The demonstration offers a very fine method for clarification. The efficient teacher will have ready, all the materials and equipment that he is to use, and will not wait until the class arrives before he begins thinking about this preparation. He will also become sufficiently expert in his field so as to be able to do things well and within a minimum amount of time. Nothing clarifies the work more than a good demonstration expertly executed, giving the pupil an opportunity to see how things are actually done.

One method of imparting the informational side of the subject is by the lecture method. Teachers are often accused of talking too much. Lectures should therefore be short, full of life, interesting, and closely related to the work being done.

The class discussion is a most important phase of the work. Pupils should be encouraged to participate freely, and with a considerable degree of intelligence in such discussions is a condition greatly to be desired. The instructor can do much to promote such activity. To stimulate discussion he will ask leading questions. This assists him in doing more leading and less participating. In his questioning, he will permit as many students to participate as possible, instead of limiting the discussion to a mere handful of students. Absolute agreement should not be emphasized. In fact, friendly rivalry and debate constitute a healthy state of affairs. The teacher must guard against being side tracked, for pupils, especially those who do not take the assignments seriously, are apt to be masters at the art of injecting irrelevant material. Occasionally the instructor will be asked to decide an issue and it is on such occasions that he must present facts fairly and arrive at a sound conclusion.

The review lesson is a very useful device. The skillful teacher will ascertain what subject matter must be reviewed in order that time will not be wasted upon material that the students already know. For this reason too, it is a very good plan to always tie up the new material with the old before proceeding with the new lesson.

Individual instruction should receive its proper share of attention, particularly during these days when so much emphasis is being placed upon the recognition of individual differences. To offer individual instruction effectively, the instructor must first acquaint himself with pupil difficulties. It is a matter of quick and careful analysis on the one hand, and a thorough knowledge and application of sound pedagogical principles on the other. Too often there exists a feeling that the real job is done when the demonstration and lecture have been completed, and that the remainder of the time may be devoted to grading drawings, completing records, writing letters or reading a book. The real task of teaching has only begun, when the treatment of individual cases has commenced. This individual work may resolve itself into such activities as a suggestion dropped here, a hint given there, interest stimulated in this student, a different viewpoint given to someone else, or the assigning of a task which is more commensurate with the mental ability of still another.

Instruction Sheets

Instruction sheets are a very valuable aid in the presentation of subject matter and should be used freely. The wise use of them most certainly adds to the effectiveness of one's teaching. They aid very materially in meeting the problem of individual differences because they specifically state each problem, and outline it or indicate how the procedure to be followed is to be outlined. By means of these sheets, special and varied interests of pupils can be more readily met, for they aid the pupil in proceeding on his own initiative. If properly used they tend to develop self-confidence and to promote individual effort. Then too, they afford the instructor a breathing spell and give him an opportunity to get his bearings especially when the class is large and the interests are many. On the other hand, they should not constitute the only teaching device which the teacher uses.

Reference materials should be available as an aid to the presentation of subject matter. Such materials should be on hand in the drafting room instead of in a library far removed from the scene of action. Pupils should be encouraged to look up materials pertinent to the problem upon which they are working. Problems should be of such a nature as to require the use of references, while the reference materials should be well adapted for such use. Topics of a general nature may be assigned and reports prepared with the use of the various publications.

Visual aids should be employed freely. It is not always feasible to take the boys to an industrial plant, but it is quite possible to bring industrial conditions to them through the medium of the moving picture. Many universities are now prepared to rent such films to the schools at a very small cost. Such pictures add interest and color to the work and give the boys much valuable information which they would not get otherwise.

Measuring should be indulged in not only for the sake of grading pupils, but also for the purpose of improving teaching. Students generally come to the teacher with an X, Y, or Z classification so that he has a pretty fair notion of their mental ability. He also is in a position to give them certain preliminary tests in his particular subject in order to ascertain that which they already know so that he will not squander their time, but will help them really to advance. It is also quite possible to give pupils credit for knowing something when, in reality, they have no knowledge of the subject for which credit is given. Then there is the matter of grading drawings to see what technics are being mastered and what skills must receive further emphasis. Examinations should be given not for the purpose of administering a large number of catch questions, but for a true reasonable test of what the child should know. The least that an examination ought to do is to cover the minimum of subject matter which has at some time been presented. Often, without some prospects of being examined, students will not do the work required. Sad, indeed, is the state of affairs where the interest is so poor that examinations become a whip or a driver to learning. However, even the very best teacher will agree, to a certain extent, that examinations are necessary even where interest and enthusiasm in the subject have been greatly aroused. Grades should not be determined entirely by the test method, but examinations and tests are a valuable aid to the accurate grading of pupils as well as a means of improving teaching.

Equipping the Pattern Shop in the Part-Time School

C. S. Hentzell, Milwaukee Vocational School, Milwaukee, Wis.

THE problem of equipping the school pattern shop must be approached with two important factors clearly in mind. These factors are the educational requirements and the funds available for the execution of the work. The purpose of the shopwork in the part-time school is twofold. First, it is designed to supplement the training of boys who are employed in pattern shops. Second, it must provide opportunity for the boy who is not working in a pattern shop, but who wants to find out by first-hand contact whether the work in patternmaking is suited to his personal likes and aptitudes. Both of these groups of boys call for shop equipment and conditions which will closely resemble the industrial shop. Tool processes and machine operation must be presented in the school shop in such a way as to make it unnecessary for the boy to "make over" the trade habits, which he may develop there, when he enters industry. With these points in mind it is clear that any tool or machine placed in the pattern shop, ought to be of the same type and quality as those used in the industrial shops. If the funds available are not sufficient to equip the shop to the ideal limit, it is the best policy to omit some of the items and secure the highest grade of equipment in that which is purchased.

In the list of necessary equipment which follows, the writer has endeavored to keep in mind the modern tendency toward individual instruction. The natural result of this individual instruction is a wide range and variety of trade operations going on simultaneously in the shop. Under these conditions it seldom happens that a large number of boys are using the same kind of tool at the same time. This makes for a reduction in the number of required tools of the various types. A tool or machine which is idle, is to that extent failing to justify its presence in the school shop. True, all machines or tools cannot be in use all the time, but unless *all* the machines and tools are in use *most* of the time, the shop is not functioning as efficiently as it should. When we enter a shop and find 20 hammers, 20 chisels, and 20 marking knives on the list of equipment, and only six or eight of each being used at any one time, we cannot help questioning the wisdom of purchasing the 10 or 12 idle hammers, chisels, and knives! The same will hold true with respect to machines. This is especially true in regard to lathes. The writer has conducted classes of 20 to 25 boys for the past several years, and has, at no time experienced difficulty in keeping every boy profitably engaged, though we have but three lathes in the shop. Further, there is no single type of tool in the shop listed on the inventory as one for each boy! This is not due to a lack of funds to purchase them, but rather to the observance of common sense in equipping the shop. The proper regulation of the sequence of the processes and operations which are involved in the construction of a pattern and core box, is one of the most important problems of the patternmaker. A boy should be trained to keep busy on his core box when he cannot get at the lathe to finish his pattern. He would have to do this in an industrial shop, so why not have him learn it in the school shop. The average shop employing 40 patternmakers will have four or perhaps five lathes. As a result, these lathes are almost constantly in use. The same efficient use of the lathes in the school shop should be practiced in the school.

From an economic standpoint it seems logical to assume that the shop should be equipped with a minimum number of tools and machines consistent with the requirements of the respective classes. These requirements will vary according to the number in the classes, and to the length of the class period. A three-hour shop period will require less equipment than a ninety-minute period. This is due to the fact that in the longer period the boys have a better opportunity to alternate in the use of the lathes, band saw, and special tools. The equipment listed below is sufficient for a class of twen-

ty boys in a shop for a period of three hours and twenty minutes. The cost of the items listed is taken from a dealers' catalog and in many instances are subject to a discount of 10 to 20 per cent.

Shop Equipment

Tools

3	back saws, 10 in.	$ 9.00
1	28-in. crosscut saw (8 pt.)	1.75
1	28-in. ripsaw (6 pt.)	1.75
10	hammers	15.00
12	try-squares, 8-in.	7.20
1	combination square	3.00
1	framing square	1.30
12	marking knives	2.25
1	¼-in. paring chisel	1.00
1	⅜-in. paring chisel	1.00
2	½-in. paring chisels	2.50
4	¾-in. paring chisels	5.00
2	1-in. paring chisels	3.00
3	¼-in. bent-shank gouges	3.75
3	⅜-in. bent-shank gouges	3.75
2	½-in bent-shank gouges	2.50
2	¾-in. bent-shank gouges	3.00
1	1-in. bent-shank gouge	1.75
1	⅜-in. spoon gouge	1.00
3	spoke shaves	2.25
2	T bevels, 6-in.	1.75
12	Gauges	12.00
1	panel gauge	.75
6	pairs 4-in. dividers	6.75
4	pairs 6-in. dividers	5.00
1	pair trammel points	1.65
3	pairs 4-in. outside calipers	3.30
1	pair 4-in. inside calipers	1.25
3	pairs 8-in. outside calipers	3.00
8	⅛ in. per foot shrinkage rules, 24-in.	12.00
6	3/16 in. per foot shrinkage rules, 24-in.	9.00
3	¼ in. per foot shrinkage rules, 24-in.	4.50
3	1/10 in. per foot shrinkage rules, 24-in.	4.50
1	fillet tool, 3/16-in. d ¼-in.	.70
6	jack planes @ $5.55	33.30
3	ratchet braces @ $5.20	15.60
3	screw-driver bits @ $ .20	.60
1	hand drill	5.50
1	¼-in. wood bit	.50
2	⅜-in. wood bits	.50
2	½-in. wood bits	.50
1	¾-in. wood bit	.65
1	⅞-in. wood bit	.75
1	1-in. wood bit	.90
1	expansion bit	2.25
12	8-in. wood clamps	21.00
6	10-in. wood clamps	12.00
4	assorted nail sets	.50
2	oil slips, 4½ by 1¾ by ½ by 3/16 in.	1.30
3	1-in. turning gouges	2.50
3	⅝-in. parting tools	2.50
1	¼-in. round-point turning chisel	.50
1	½-in. round-point turning chisel	.65
2	½-in. spear-point turning chisels	.65
1	½-in. square-point turning chisel	.65
2	1-in. square-point chisels	.75
2	8-in. hand screw drivers	.50
2	⅛-in. twist drills	.30
2	3/16-in. twist drills	.40
2	¼-in. twist drills	.60
1	8 by 2 by 1-in. medium india oil stone	1.50
1	8 by 2 by 1-in. fine india oil stone	1.50
12	1¼-in. pinch dogs	1.50
6	¾-in. pinch dogs	1.50
1	1-qt. electric glue pot	20.00
1	gas furnace	10.00
1	melting ladle (26 lb. lead)	1.00
1	12-in. disc sander	150.00
1	spindle sander	200.00
1	universal saw	350.00
3	½-in. band saws to fit power machine	6.00
1	band saw	400.00
1	motor-driven scroll saw	27.00
12	assorted brushes—1½ in., 1 in., round	2.40
	Total	$1296.15

Supplies for One Year

1500	ft. No. 1 shop pine @ $80.00	$120.00
500	ft. ⅜-in. dowel rod	6.00
100	ft. ¼-in. dowel rod	1.50
200	ft. ½-in. dowel rod	3.00
3	rolls ⅛-in. wax fillet	4.50
3	rolls ¼-in. wax fillet	4.20
100	ft. 3/16-in. leather fillet	3.00
200	ft. ¼-in. leather fillet	8.00
100	ft. ⅜-in. leather fillet	6.00
4	gal. white shellac	5.00
5	gal. denatured alcohol	3.50
2	lb. black pattern color	.50
2	lb. red pattern color	.50
2	lb. canary yellow color	.50
12	lb. assorted brads, ½, ¾, 1, 1¼, 1½ in.	5.40
6	lb. 6d fin. nails	.30
5	lb. 10d fin. nails	.25
12	gross assorted screws, ⅞, 1, 1¼, 1½, 1¾, 2, 2¼ in.	6.00
25	lb. glue	8.40
	Total	$186.55

If funds are not available to purchase all of the equipment mentioned in the foregoing at the prices quoted, a distinct saving can be realized by purchasing rebuilt machines from one of the many reliable dealers. Under pressing circumstances, the universal saw could be omitted. Likewise, if the course is designed accordingly, the scroll saw could replace the band saw. This would work out satisfactorily if the various sections of patterns and core boxes did not exceed 1¼ in. in thickness. I would not advise omitting the two sanding machines. The universal uses to which these machines are put in the pattern shop render them practically indispensable. A class in typewriting without typewriters would be about as practical as a pattern shop without sanding machines.

The supply of lumber listed does not include an allowance for layout boards. Each boy should be provided with a layout board approximately 12 by 16 by 1¼ in. with cleats of the same thickness. This will mean an addition of 2½ board feet of lumber for each boy. These boards ought to last two years, which will mean an addition of approximately 1¼ ft. of lumber per boy per year. Part of this addition of lumber will be offset by using the lumber in the old layout boards for small parts of patterns such as core prints, pads, core-box ends, etc.

When changing the shop over from the regular woodwork to patternmaking the tools which were previously used can be retained. It will then be necessary to purchase only the special tools listed above which were not on the old list of equipment.

It should be noted that a surfacer is not listed as required equipment. This is due to the fact that a course in patternmaking can easily be worked out in such a way as to require perhaps four or five thicknesses of lumber. This lumber can then be ordered from the mill in the required sizes. If a surfacer can be purchased it is, of course, a good investment for the shop. A jointer might also be added, although the disc sander will serve the purpose equally as well on the medium-size patterns which are constructed in the school shop.

What Principals Think of Household Mechanics

Earl L. Bedell, Supervisor of Vocational Education, Detroit, Mich.

THE following statements have been picked at random from reports made by 21 principals of Detroit schools in which household mechanics is taught. With the widespread interest displayed in courses of this kind, the opinions of these principals may be welcomed by many readers of the INDUSTRIAL ARTS MAGAZINE:

In this day and age I think it is very necessary for every man and boy to have a general knowledge of tools and how to use them. Household mechanics is very useful to a boy, because he can put into immediate use practically everything he learns.

From the informational and exploratory side it brings out the different activities, such as electricity, benchwork, plumbing, glazing, painting, and sheet-metal work. It gives an intelligent idea of the different kinds of work, and brings out likes or dislikes for the different mechanical operations in everyday life.

It is valuable from the counselor's standpoint in that he learns from the conferences with the different shop teachers, the unusual abilities the student has for the various kinds of mechanical operations.

It has practical value in that it fits the student to look after the mechanical devices around the home premises. This is one of the most valuable courses in the school because of the varied experiences which it offers.

This course is very practical because it contains those things which everyone is, or should be interested in knowing. Such things as mending a lamp cord and socket, or replacing the heat elements in an electric iron or toaster are worth knowing how to do.

It not only teaches the boys how to use ordinary tools and how to construct and repair household articles which make for more comfortable living, but it also shows them how to do interesting things that are worth while. It teaches them habits of industry and how to attack mechanical problems in an intelligent manner.

Household mechanics aims to direct the attention of the boy toward the problems of the home and to arouse his interest in solving these problems. The solution of these problems requires systematic planning and specific training in the use of tools in the execution of plans. Once a boy has mended a broken chair, repaired a leaky faucet, or refinished worn or marred furniture, he gets a feeling of pride in the improved appearance and efficiency of the things he has repaired. He begins to understand how things should look and operate; or, in other words, the ideal home begins to mean something definite to him.

Aside from the manual aspect, the course carries with it a vast amount of related knowledge that each boy should know to go through life.

Its value is partly in being able to repair the home equipment. Educationally it is probably as valuable as the rest of the course. The boys have much more interest in the general work than they would have in woodwork alone. It creates a better feeling of cooperation between the parents and school.

The value of this course lies in the individual instruction which helps the boy to discover his abilities through an activity that better fits him for the problems of life.

It is an added attraction or inducement to help keep many boys in school who may enjoy shopwork but who do not like academic work. I can often get renewed interest in schoolwork from boys who wish to leave by putting them in this shop course. In this way the household-mechanics course is a great help.

It enabled the boy to do common repair jobs about the house that would otherwise require skilled labor and cause expense. It gives the boy a wider knowledge of the different trades and may help him in deciding what trade he wishes to follow when he finishes school.

1. To be able to make repairs around the home premises.
2. Parental sympathy and cooperation with the work of the school, when they see what their son can do with knowledge obtained in his schoolwork.
3. The satisfaction a boy gets out of being able to make the repairs.
4. The encouragement for further education a boy gets out of his own satisfaction and parental praise in being able to do things.
5. Better citizenship which results from keeping the home premises in first-class shape.

The purpose of household mechanics is to aid in making the boy or girl a worthy home member.

It is just as essential for a girl to know how to repair an extension cord of a flat iron, to tell a screw driver from an auger bit, to use a hammer, and to distinguish basswood from walnut wood in furniture, as it is for a boy. Likewise I think a boy should know a few of the essential facts about cooking, baking, diet, etc. A very good idea would be to let the boys exchange their course with the girls, for nine or ten weeks if they so choose. It would make an ideal combination in any home, and would greatly increase the value of the household-mechanics course.

The instruction in the shop is of immediate use. One learns more about a thing by working on the job (taking apart, putting together, repairing or adjusting) than by any amount of reading or hearing.

A handy boy becomes a handy man, and possibly a skilled mechanic, a thorough accurate worker, a desirable productive citizen.

I believe a pupil foreman gets much benefit by working over a group, therefore I want every boy to have the chance to be foreman.

Household mechanics, by teaching boys to be useful about the home, offers one of the best opportunities to get community appreciation. Boys should get the feeling that the home deserves first consideration, and things done to better adjust the home are much worth while.

A sense of inherent ability to achieve, confidence in oneself to take a job and see it through are virtues which would make many men more useful and many homes more happy. Understanding some of the tasks of this course dissipates the feeling that many things are too difficult for the layman and are wholly confined to the province of the skilled specialist. The economy of having saved what it would cost to have a mechanic come in and do the job gives satisfaction.

Attitudes and ideals are as important today as knowledge. This course teaches boys that many jobs can be better done by working together than alone. This stimulates helpfulness, cooperation, and it is hoped, neighborliness.

Home mechanics has a direct value in that it is an exploratory or tryout course. Several activities are being carried on in the one shop at the same time, and the pupil has an opportunity to try them all. The pupil learns the names and uses of the different tools and materials used in the shop. He learns tool processes and operations and builds up a technical vocabulary. It brings the parents, teacher, and pupil, also the community and school closer together.

In the general shop, student-directed activities are carried on. That is, they have a superintendent and foreman system. From this the boy develops leadership, a sense of responsibil-

ity, initiative, self-appraisal, courtesy, judgment, and many other attributes. This system in the general shop seems to create more interest and brings about a more businesslike attitude on the part of the pupil. This, I believe, can be best developed in a general shop.

The household-mechanics course deals with a wide range of subject matter. It gives the boy a general knowledge of the use of many different tools and materials in the maintenance of the home and premises, and a knowledge of how to make necessary repairs and adjustments on quite a number of different mechanical devices. It also gives the boy a broad field for exploration or "tryout."

The course of study in household mechanics is arranged to suit the needs of the community. For example, in a farming locality, the stress should be placed on machinery repair, construction of stock inclosures, troughs, and "kinks" and devices of all sorts.

A great deal of practical and consumer's value is derived from this course on account of its variety of subject matter, and there is also a greater correlation with home life.

1. To teach the use of tools and materials, mechanical devices, and maintenance in relation to the home premises.
2. To give students more confidence in doing repair jobs about the home.
3. To teach thrift within the home.
4. To give indirect civic training.

1. The boy obtains a sense of values from the consumer's point of view. This is very necessary if we are to help him with his pecuniary expenditures.

2. The boy becomes an asset around the home because he is taught to do small repair jobs. Many boys never receive such training, hence they often are total failures as handy men about the home.
3. Provides a multiplicity of activities. Interest is easily maintained where this is the case.

1. Pupils obtain experience with a greater variety of material.
2. The course provides for taking care of individual differences, tastes, and abilities.
3. Participation in several activities requires a wider range of thinking and is more educational.
4. It makes possible the development of initiative, and it stimulates individual thinking on the part of the pupil.
5. It eliminates waste of time caused by duplication of processes in the one-industry shop.

The course also serves to bring a closer relation and a better spirit of cooperation between the home and the school.

It brings a closer relation between the child and his parents because he is proud to think he can repair something about the home.

Household mechanics deals with a broad field of activities, therefore the boy derives knowledge of various fundamental processes in wood, metal, electrical and general repairwork, all of which help to make him a handy man about the home. It develops skill in manipulating and properly caring for tools.

The household mechanics course is valuable because it attempts to put into practice the objectives of education, and gives the boy an opportunity to follow the vocation for which he is best suited, thus becoming prevocational.

A Drafting Practice Survey

H. D. Campbell, J. Sterling Morton High School, Cicero, Ill.

THE purpose of this survey was to determine, in regard to certain debatable points, the practice most generally used in industrial drafting departments.

In order to obtain this information, 250 letters were mailed. Each enclosed a questionnaire and a request for a typical set of drawings.

One hundred and thirty firms returned the questionnaire or forwarded blue prints or both. Twenty-three of this number sent their drafting manuals.

The returns from one-hundred firms were selected. The basis of selection was: To discard those of companies whose business makes their practice far out of the ordinary, to include as great a variety of product as possible, and to obtain a broad geographical distribution of firms represented.

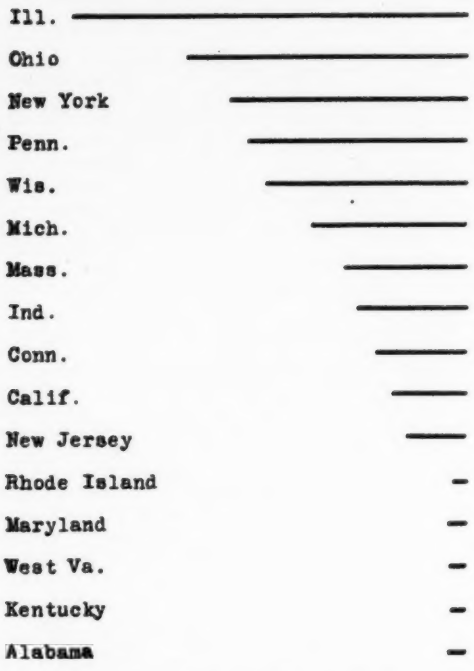
It is hoped that this report demonstrates the need for further simplification and standardization of some of the routine drafting practice in industry and the necessity for revising many of the methods used in schools preparing students for entry into industry.

The Firms Which Cooperated in the Survey

Addressograph
Advance-Rumely
Allis-Chalmers
Aluminum Co. of America
American Brass
American C. I. Pipe
Amer. Car & Foundry
American Die & Tool
Amer. Rolling Mills
Armstrong Brothers
E. C. Atkins & Company
Baldwin Locomotive
Barnhart Bros. & Spindler
Barber-Colman
Bearings Co. of America
Bethlehem Steel
Benjamin Electric
Black & Decker
Blackmer Pump
Borg & Beck
Brown & Sharpe
Brunner Manufacturing
Bucyrus Company
Browning Crane
Buffalo Forge
Burroughs Add. Machine
J. I. Case Thresh. Mach.
Cutler-Hammer
Cleveland Punch & Shear
Cleveland Twist Drill
Cramp Ship-building
Crane Company
DeVilbiss Mfg.
Delco-Light
Delco-Remy
John Deere Plow Co.
Dictaphone Corporation
Diebold Safe & Lock
Dudlo Manufacturing
Durston Gear
Dodge Boat Works
Eastman Kodak
Eisemann Magneto
Elgin Watch
Elliott-Fischer
Erie Steam Shovel
Eureka Vacuum Clean.
Evinrude Motor
Fairbanks-Morse
Ford Motor
G. A. Gray
Gardner Machine
General Electric
Gen'l Fireproofing
Geometric Tool
Goulds Pump
Harley-Davidson
Hoover Company
Hupp Motor
Hurley Machine
Hyatt Bearings
Hydraulic Brake
Imperial Brass
Inland Steel
Inter. Harvester Co.
International Nickle
Johnson Service
Kelvin Engineering
Keuffel & Esser
Kewanee Boiler
Landis Engineering
Landis Tool
Le Blond Tool
Lima Locomotive
Llewellyn Iron Works
Lodge & Shipley
Lunkenheimer Co.
Miehle Print. Press
Millers Falls
Moreland Truck
Moto Meter Co.
Nash Motor
National Acme
National Cash Regist.
Nordberg Mfg.
North East Electric
Norton Grinding
Oliver Machine
Otis Elevator
Pacific Electric Mfg.
Parker Pen
C. F. Pease Company
Pelton Water Wheel
Photostat Corporation
Pratt & Whitney
Pullman Car

Reed Prentice	Henry Vogt Company
Remington Arms	H. J. Vogel Company
Reo Motor	Vonnegut Machine
Roller-Smith	Wahl Company
J. T. Ryerson & Sons	Waltham Thread
Singer Manufacturing	Waltham Watch
Sparks-Withington	Walworth Manufacturing
Standard Gas Equipment	Warner Gear
L. S. Starrett	Wayne Company
Stewart-Warner	Western Electric
Stone & Webster	Western Harvester
Stover Mfg. & Engine	Westinghouse Electric
Sullivan Machinery	Whiting Corporation
Templeton, Kenley & Co.	Wisconsin Electric
Timken Roller Bearing	Winchester Arms
Toledo Scale	Woodstock Typewriter
Victor Talking Machine	York Manufacturing

GEOGRAPHICAL DISTRIBUTION OF FIRMS



Variety of Products Represented

Adding machines, air brushes, automobiles, automotive brakes and clutches, auto horns, ball and roller bearings, blue-print machines, cash registers, circuit breakers, comptometers, cranes, dies, drill presses, electric supplies, electrified hand tools, exhaust systems, gasoline and Diesel engines, elevators, electrical measuring instruments, electric motors, farm lighting systems, farm machinery, fountain pens and pencils, foundry equipment, firearms, grinders, gears, gasoline pumps, heavy machinery, lathes, lathe tools, locomotives, milling machines, mining machinery, motorcycles, motor meters, oilwell supplies, phonographs, planers, plumbing supplies, punches, railroad cars and equipment, refrigerating machinery, safes, sewing machines, scales, screw products, shears, steam shovels, shapers, speedometers, taps, telephone equipment, precision tools and gauges, drafting tools and supplies, hand tools, cutting and welding torches, trucks, turbines, twist drills, typewriters, vacuum cleaners, woodworking machinery, washing machines, and watches.

The Debatable Points

		Per Cent
1.	*a*) Basic sheet size, 8½ x 11 in.	28
	b) Size, 9 x 12 in.	35
	c) Miscellaneous sizes, no two alike	37
2.	*a*) In production tracings use cloth and ink	58
	b) Use tracing paper, bonds paper, or vellum	12
	c) Both	30
3.	*a*) In toolroom tracings use cloth and ink	2
	b) Use tracing paper	90
	c) Both	8
4.	*a*) In product tracings on paper use ink	0
	b) Use pencil	37
	c) Both	5
	d) Do not use paper in product tracings	58
5.	*a*) In toolroom tracings on paper use ink	7
	b) Use pencil	77
	c) Both	16
6.	*a*) Border lines pen drawn, title plates rubber stamped	9
	b) Use printed sheets. As in (*a*) for large or special drawings	90
	c) Undetermined	1
7.	*a*) Use first angle projection	18
	b) Third angle	63
	c) Either	17
	d) Undetermined	2
8.	(See Fig. 1)	
	a) Two weights of line used	41
	b) Three weights	35
	c) More than three	6
	d) Undetermined	18

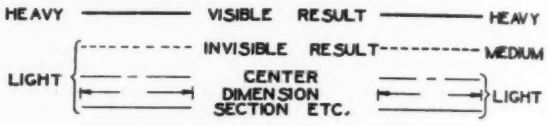


FIG. 1

9.	*a*) Use shade lines or patent office methods	4
	b) Do not	96
10.	*a*) Elevations with invisible lines used in assemblies	4
	b) Sectional assemblies used	61
	c) Either	30
	d) Undetermined	5
11.	*a*) All invisible lines on assemblies	4
	b) Only principal lines	94
	c) Undetermined	2
12.	*a*) Some dimensions (travel, over-all, etc.) on assemblies	76
	b) No dimensions	22
	c) Both	2
13.	*a*) Naturalistic threads on assemblies	3
	b) Conventional threads	88
	c) Both	7
	d) Undetermined	2
14.	*a*) In product drawings, several details on sheet to be cut up and distributed	5
	b) Several details on a sheet	14
	c) Separate sheet for each detail	81
15.	*a*) In toolroom drawings, several details on a sheet	79
	b) Separate sheet for each detail	21
16.	*a*) In product drawings: material, number required, finish, etc., given with each detail	49
	b) Above given on attached table (usually assembly sheet)	11
	c) On separate sheet	19
	d) Both (*a*) and (*c*)	21
17.	*a*) On toolroom drawings: material, number required, finish, etc., given with each detail	70
	b) On attached table	14
	c) On separate sheet	5
	d) Both (*a*) and (*c*)	11

	Per Cent
18. (See Figure 2)	
a) Use superimposed sections to show shape	2
b) Elevations with invisible lines	8
c) Sectional elevations	46
d) Both (*b*) and (*c*)	22
e) (*a*), (*b*), and (*c*)	14
f) (*a*) and (*c*)	5
g) Undetermined	3

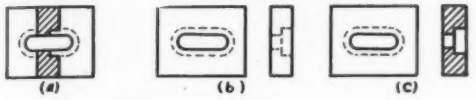


FIG. 2

19. (See Fig. 3)	
a) Use true sections only	55
b) Conventional sections used with unsymmetrical objects	38
c) Either	5
d) Undetermined	2

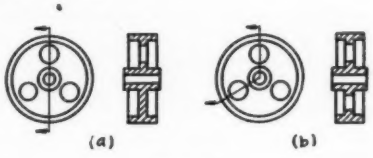


FIG. 3

20. *a*) Naturalistic threads on details	3
b) Conventional threads	92
c) Both	5
21. (See Fig. 4)	
a) Conventional threads with slant lines to show R.H. or L.H.	65
b) Conventional threads, lines square across, L.H. thread noted	27
c) Conventional threads as (*c*) above	3
d) Conventional threads not used	3
e) Undetermined	2

FIG. 4

22. (See Fig. 5)	
a) Tapped Holes in plan as at (*a*)	79
b) As at (*b*)	10
c) As at (*c*)	9
d) Miscellaneous methods	2

FIG. 5

23. (See Fig. 6)	
a) Tapped holes in elevation as at (*a*)	38
b) As at (*b*)	30
c) As at (*c*)	27
d) Miscellaneous methods	5

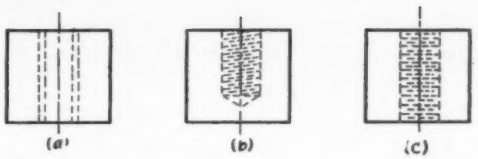


FIG. 6

	Per Cent
24. (See Fig. 7)	
a) Read dimensions from bottom and right	90
b) From bottom only	9
c) Undetermined	1

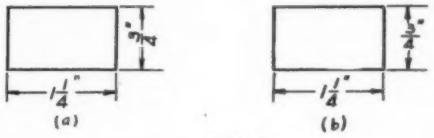


FIG. 7

25. (See Fig. 8)	
a) Dimensions as at (*a*)	89
b) As at (*b*)	4
c) As at (*c*)	4
d) As at (*d*)	3

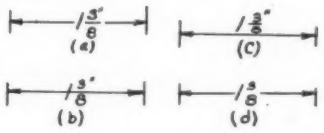


FIG. 8

26. *a*) Feet and inches as: 6' 2"	3
b) As: 6' - 2"	52
c) As: 6 Ft. 2"	5
d) As: 6 Ft. 2 In.	1
e) As at Figure 9	1
f) Do not use feet in dimensioning	38

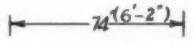


FIG. 9

27. *a*) Feet and fractions of an inch as: 6' - ½"	15
b) As: 6' - 0½"	41
c) As: 6 Ft. ½"	2
d) As: 6 Ft. 0½"	2
e) As: 6 Ft. ½ In.	1
f) As: at Figure 10	1
g) Do not use feet in dimensioning	38

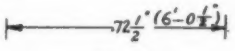


FIG. 10

28. *a*) Dimension entirely in inches	38
b) In Inches to 12	2
c) To 24	45
d) To 36	2
e) To 60	12
f) See 26 (*e*) and 27 (*f*)	1
29. *a*) Use inch marks	68
b) Omit	31
c) Use marks on whole numbers only	1
30. (See Fig. 11)	
a) Dimension so checker may total against over-all even when additional dimensions are not needed for layout	47

	Per Cent
b) Give dimensions necessary for layout only	52
c) Undetermined	1

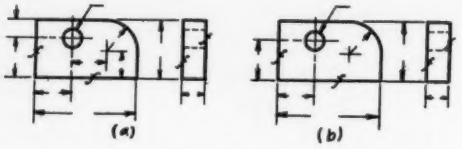


FIG. 11

31. (See Fig. 12)

a) Half dimensions given on each side of the center line	42
b) Total dimension both sides of the center line	44
c) Both	8
d) Half dimension one side of the center line	3
e) Undetermined	3

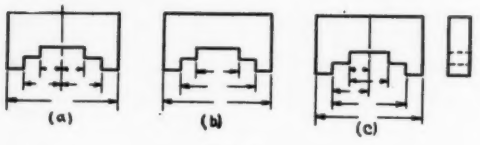


FIG. 12

32.	*a*) Vertical lettering	57
	b) Slant	47
	c) Both	36
33.	*a*) Capitals only	59
	b) Caps and lower case	37
	c) Both	4
34.	*a*) Lettering underlined	26
	b) Not underlined (unless for emphasis)	70
	c) Either	3
	d) Undetermined	1
35.	*a*) Sheet size indicated by number or letter in drawing number	56
	b) Do not	43
	c) Both	1
36.	*a*) Pattern numbers based on part numbers	58
	b) Separate series for patterns	36
	c) Both	5
	d) Undetermined	1
37.	*a*) Specify tool operations (drill, ream, core, mill, grind)	42
	b) Do not	58

38. (See Fig. 13)

a) Arrows point toward section	75
b) Away from section	15
c) Either	2
d) Do not use arrows	2
e) Undetermined	6

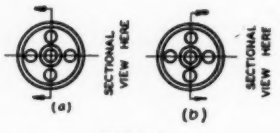


FIG. 13

39.	*a*) Use from 1 to 4 cross-hatchings to show material	38
	b) From 5 to 10	24
	c) From 11 to 20	31
	d) More than 20	7
40.	*a*) Use one weight of line in crosshatching	60
	b) Two weights of line	34
	c) Three	4
	d) More than three	2
41.	*a*) Use red ink or red pencil lines to show part for which tool, jig, or fixture was made	36
	b) Use black ink or black pencil lines	29
	c) Use neither, refer to tool list, etc.	14
	d) Undetermined	21

42. (See Fig. 14)

a) Use as at (*a*)	36
b) Use as at (*b*)	33
c) Use as at (*c*)	12
d) Miscellaneous methods	12
e) Undetermined	7

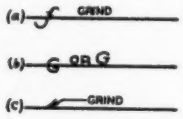


FIG. 14

43.	*a*) Specify fits in decimal dimensions	88
	b) Specify fits as "running," "slip," "press," etc.	2
	c) Use decimal dimensions for product, and specify as at (*b*) for tools	8
	d) Undetermined	2
44.	*a*) Show decimal dimensions as at (*a*) Figure 15	57
	b) As at (*b*) Figure 15	33
	c) Use both	2
	d) Undetermined	8

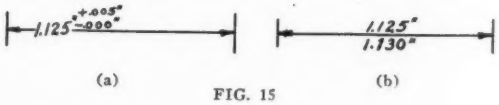


FIG. 15

45. (See Fig. 16)

a) Use heavy center line to show where section is taken	30
b) Heavy solid line	17
c) Medium dash line	14
d) Light continuous line	14
e) Light dash, two dots	10
f) Light center lines, heavy corners	5
g) Undetermined	10

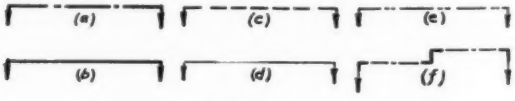


FIG. 16

46. (See Fig. 17)

a) Show "ditto" lines like center lines	19
b) Light dash lines	19
c) Light broken lines	12
d) Light solid lines	10
e) Light dash, two dots	5
f) As above	2
g) Do not use	14
h) Undetermined	19

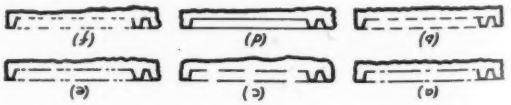


FIG. 17

PERSEVERANCE.

I am the most wonderful word in the English language. The most important trait in all human character. Without me, Love-Honor-Duty-Religion-Education- are words lacking meaning.
In learning anything; in doing anything; in being anything; I am the all-important ingredient, and nothing worth while is ever accomplished without my aid.

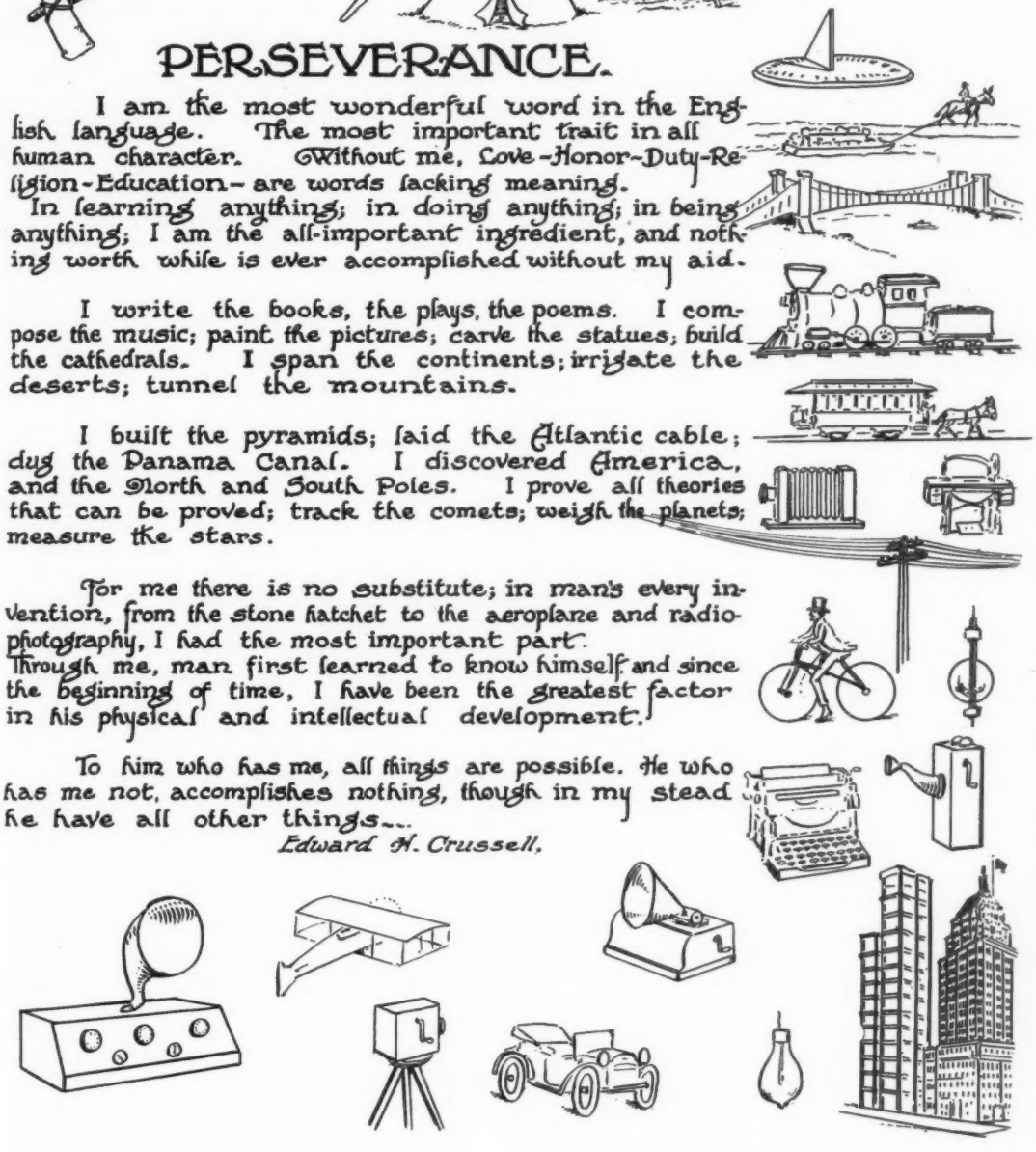
I write the books, the plays, the poems. I compose the music; paint the pictures; carve the statues; build the cathedrals. I span the continents; irrigate the deserts; tunnel the mountains.

I built the pyramids; laid the Atlantic cable; dug the Panama Canal. I discovered America, and the North and South Poles. I prove all theories that can be proved; track the comets; weigh the planets; measure the stars.

For me there is no substitute; in man's every invention, from the stone hatchet to the aeroplane and radio-photography, I had the most important part.
Through me, man first learned to know himself and since the beginning of time, I have been the greatest factor in his physical and intellectual development.

To him who has me, all things are possible. He who has me not, accomplishes nothing, though in my stead he have all other things....

Edward H. Crussell.



INDUSTRIAL-ARTS MAGAZINE

EDITORS

E. J. Lake *J. J. Metz* *S. J. Vaughn*

WORK WITH A CHALLENGE

If the work with wood and metal and concrete did nothing but offer resistance, challenge the boy's ingenuity, and command respect for the fundamental nature and principles of those materials, it would be well worth the trouble and expense. In this slip-shod and easy-going day, it is worth while to have a type of work that requires careful consideration, intelligent approach, and skillful manipulation. It is something of a discovery for some boys to find that there is something their dads can't buy; that will not yield to coaxing, bluffing, nor force; that can only be achieved by sincere, honest effort in strict harmony with its natural laws and principles.

When a boy works with white oak, tool steel, concrete, or marble, he knows, or else he soon finds out, that his whims and his fancies will avail him nothing unless he gets down to business, understands the laws of the materials and of the tools and machines with which to fashion them, puts himself into harmony with them, and conscientiously strives to acquire sufficient skill to achieve his purposes.

THE ANNUAL TASK

The month of May is again approaching and with it come thoughts of the final wind-up of the school year, and the vacation activities beyond. Much remains to be done, however, before the school year 1928-29 is closed. The termination of any definite period always presages the opening of the next; hence it is perfectly proper that at the closing of the school year we should plan for the opening of the next school term.

To the shop teacher, this immediately brings thoughts of new supplies and probably of new equipment or repairs to the present equipment in his shop. The delivery of supplies and equipment usually requires time, hence it is advisable to make ample allowance for it. We are much more apt to get better, cheaper, and more efficient service from the dealers and manufacturers if we do not wait until the material is absolutely necessary before it is ordered.

The month of May is still fairly far removed from the closing date of the school, and it would be wise to make use of this time to think of the future needs of our shops. Our study should include a close scrutiny of the equipment on hand to see whether it is still in such condition that it will answer the exacting requirements of an efficiently conducted school shop. It will be found profitable also, to go back over the records of the year just past and see whether last year's requisitions for supplies were adequate or whether changes in the quantity of this or that commodity should not be made. The outline of instruction also should be carefully looked over to ascertain whether the projects that were not so satisfactory in the past year, should not be discarded and replaced by better chosen problems.

Of course, there are teachers who will not return to their present shops next year. These should be guided by the golden rule even though their successor may not be satisfied with what he finds in the shop. They should remember that criticizing the work of another adversely is the common failing of humanity. But they also should remember that if the resigning teacher has done his duty as he should, the incoming teacher will have less right to criticize because he will find the tools and equipment in good condition and the supply racks filled.

Yea, verily, May is the time to not only think about your requisitions, but to actually get them out.

THE ART OF TEACHING

Teaching is the finest and the most difficult of the fine arts. Those who look upon it as simply the work of a taskmaster have missed all the beauty, the pleasure, and the inspiration of teaching as an art. It is almost as rare to find a skillful teacher as it is to find a skillful painter. The one requires as much time, skill, and patience as the other.

In the first place, teaching is *influencing* people to become what they are not. It is the definite and intimate contact of mind with mind and life with life. It is a community of interest—a fellowship.

Also, teaching deals with those intangibles—mind, spirit, life. Because of this, it is an uncertain and slow process. Sometimes we have to wait so long to see the results of our teaching, that it is too late for the individual to recover from our mistakes and blunders by the time we discover that we have made them. With all the good coming out of the present bewilderment of experimentation in teaching there is an unmeasured danger to those upon whom the experiments are being tried. Many a teacher's life and conduct belie his professions and counteract his precepts.

What a lamentable thing it is to see poor, listless, unskillful teaching, especially in the grades and high school! Teachers have been heard to say, "Well, I give it to them; I put the material before them. If they don't take it, why, it's no fault of mine." Such an attitude assumes that boys and girls come to school with definite purposes and thrilled with eagerness for what the teacher has to offer. Unfortunately, this is sadly and pitiably untrue. Many of them come with the attitude, "Well, here I am; teach me if you can." *It's the teacher's job.* The teacher must *interest* the pupil in the teacher's program and material. He must know the laws of learning, the principles of mental activity, the psychology of habit formation, the mental attitude and ability of pupils of various ages, the natural reactions of such pupils to the various activities and problems of the schoolroom. Knowing these, he must also have such a grasp of his subject matter as will enable him to adapt proper and suitable

portions of it to the various and varying conditions represented by his varied groups of boys and girls. In addition, he must be familiar with the various methods of presentation and be able to select and use the method best adapted to the particular groups and conditions as they present themselves.

The teacher must know that nobody else's method will exactly fit his needs, nor will any one method apply to every individual case. He must be able to modify and adapt any method to meet special cases and conditions.

When a teacher is able to arouse a legitimate and sustained interest in the work in hand, to secure an active participation of every pupil, to present his material in such a manner as to reach the understanding of his pupils, to use part of the recitation for skillful testing, so that he is convinced that the pupils have grasped the fundamental principles of the lesson, to assign the work of the succeeding lesson in such a clear and concise manner that the pupils know definitely what is expected of them, to hold the complete attention of the class, and to waste no time, he may be said to have some understanding and skill in the art of teaching.

Such a task is an endless and a difficult one, and will never be accomplished by the lazy or indifferent teacher. But it is as fine an achievement as the painting of a beautiful picture—it is a work of art and nobody but the real artist can do it.

—⟡—

AT THE CONVENTION

This meeting was not on the Convention program, and there were no "high-hats" present. The hour was so late that the big clock over the hotel desk was about to call it a day. Bug Jones started something when he said he must get back home by Saturday or lose his job.

"You mean you will miss the game," purred catty little Smith from Podunk.

"Same thing," said Jones glumly.

"Same thing, how?"

"Well! Our team has been going pretty good so far, but a game lost just now would put us out of the running and if they lose that game Saturday and find out I was not there it will be just too bad for the coach."

"But the Saturday program on courses of study is the one you wanted to get."

"Yeah! Moral is, don't coach and try to do anything else well."

And so we discussed the school situation in general and the athletic coaching situation in particular.

—⟡—

AGE VS. YOUTH

The recent investigation of Professor Thorndike, of Columbia University, regarding the ease of learning of adults and children will have a far-reaching effect.

The results of this investigation shows plainly that the more mature students who attend evening schools can learn just as rapidly, or more rapidly in some cases, than the younger pupils who are attending in the grades.

This is highly encouraging to those who are engaged in adult education and it also should act as a spur to those who have reached adulthood and are dissatisfied with their present lines of work.

No longer need anyone be influenced by the old adage, "You can't teach an old dog new tricks."

—⟡—

A THUMB OR A FINGER

Laurence Parker, Kansas State Teachers College, Pittsburg, Kansas

Which am I? Which are you—a thumb or a finger? The answer is important to us and to others as well.

Not long ago I tabulated some questionnaires returned by superintendents of schools concerning vocational teachers. One question, "Does he cooperate?" brought some startling answers and set me thinking about the importance of cooperation of a teacher in the educational program—especially a shop teacher.

As I thought about it, it struck me that a shop teacher can be either a finger or a thumb on the educational hand.

The finger sticks close beside his three companions and when they grip things and work, he does too. The thumb stands off by himself. Of course he is of some use but he isn't the help he would be to the fingers if he could and would line up with them when gripping things. He is more conspicuous than the others—a solo or star player as it were.

The thumb type of teacher is paid to teach manual training and he has his set of stunts, exercises or pseudojobs for the boys to do. If a shelf is needed in the physics department, or a cabinet in the sewing room it just can't be done by the boys or the instructor either. He just proves that the thumb doesn't line up with fingers.

Of course it's well for boys to know how to put up shelves at home, build boxes and cabinets and many other things but "it interferes with the program."

From the answers of the superintendents I am convinced that they prefer the "finger type" of teacher who will cooperate as nearly 100 per cent as possible in supplying school needs.

How many of us ever hit a finger with a hammer? Seldom, it's true, but the thumb gets a rap often. I wonder if the figure doesn't still hold true. We all have failings and shortcomings. Perhaps if we are content to be fingers we will avoid a rap, knock, or bump that happens so easily and so painfully to thumbs.

—⟡—

SPECIALIZATION

One does not live long enough to learn much about very many things in life. Branches of training must be taught that will fit boys for the specialized work of industry. It is important that each be trained as a specialist in some one of the different trades, such as machinist, cement worker, or the railway machine-shop trade.—*Sunderland.*

Simple Airplanes

A. F. Scribe, Ann Arbor, Mich.

THE tools and materials used for making simple flying machines are available in some form to nearly every boy and girl, at home or at school. Usually the materials are cut to size, and only a pocketknife and pair of round-nose pliers are needed. For more extensive work, other tools are necessary.

The materials include soft light wood for propellers and motor bases; steel or iron wire for hooks and propeller shafts; rubber bands, strands, or sliced inner tubes for motors; silk thread; glue or cement; beads or washers; bamboo; and silk tissue paper. Occasionally light wood also is used for the wings.

Figure 1 shows the tools which should be found in the junior aviator's tool kit. (1) Figure 1 shows a simple egg beater transformed into an airplane motor winder. (2) A geared hand drill into which a hook formed of heavy wire or of a finishing nail has been inserted for use as an airplane motor winder. (3) A sharp pocketknife. (4) A side-cutting pliers. (5) A can of cement (a cement with celluloid base is best). (6) A block plane. (7) A thumb drill. (8) A round-nose pliers. (9) A hack-saw blade, which can be substituted for the knife in the adjustable handle. (10) An adjustable marking knife. (11) A drill or wire gauge.

The egg beater and hand drill are used for winding the airplane motors. The knives are used in carving the propellers, shaping the wings, elevators, and motor sticks, and in cutting thread. The side-cutting pliers are used for cutting the wire from its coil *after* each wire part is completed. The round-nose pliers are used for shaping the wire parts. Cement is used for attaching wire parts to motor base or propeller, and for sticking together wood parts. Tissue is attached best by means of amyl acetate, usually bought under the name of banana-oil bronzing liquid. No other kind of bronzing liquid should be used. The block plane is used in preparing the various wood parts—bases, wings, elevators, propellers. The thumb drill is for drilling holes through propeller hubs, in which the shaft will later go. The hack saw, of course, is for sawing off tiny parts of the wood members of the airplane. The drill gauge is used for determining the sizes of wire used, and for accurate measuring when shaping of bamboo wing spars, of fuselage longerons.

A workbench is the best place to work, although most junior aviators work wherever they can find a level place—on the porch, in the barn, on the floor, or on the ground.

Materials

In making tiny flying machine, lightness is important. Accurate workmanship, care in applying just enough cement to hold the parts during flights and landings, and sandpapering off every grain of wood dust that it is possible to get off without too greatly reducing the strength of the parts, all are required to reduce the weight of the completed machine as much as possible.

For surfaces in these small airplanes thin balsa wood is recommended. It is one of the lightest known woods, and is said to be 90 per cent air. A block of oak weighs about 45 times as much as a block of balsa of the same size. Balsa is one of the weakest of all woods and *must* be handled with great care. It may be used for making the plane wings, propellers, and also motor base.

Other woods found usable for motor bases and propellers, wing edges and braces, bulkheads or "radiators" include spruce, basswood, white pine, and second-growth red cedar. The lighter the wood, the better, just so that it is strong enough.

Steel piano wire is generally used for the bearings, S-hooks, propeller shafts, and end hooks. Iron wire also has been used successfully, but it does not retain its shape as well as steel wire does, nor does it resist wear as well.

Any cement, aided by a few turns of silk thread, will hold the motor-base wire parts securely in place. Experienced miniature aircraft fliers usually use a cement with a celluloid base, such as ambroid or dupont's household cement. Banana oil, when applied to the wood airplane parts, strengthens them without adding very much to their weight. It also gives them a glossy finish when they are polished repeatedly.

Para rubber ⅛-in. flat is best for motors. Rubber bands are used for wing holders.

Silk thread is stronger for its weight than any other thread.

Wire Parts

Wire may be either steel or iron. Steel piano wire is harder to handle than iron wire, but the parts made thereof are more permanent and less likely to wear out or bend. Iron wire, however, is easy to bend and is recommended for beginners.

Paper clips, or hairpins, will do to practice on until the desired shapes are mastered.

If a coil of wire is used, make the part complete before clipping it off, as this enables you to keep a better hold on the wire during the various bendings.

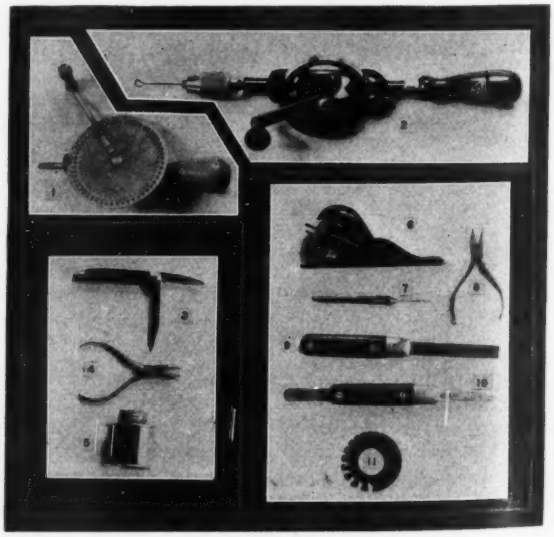


FIG. 1
Photos by Roswell E. Franklin.

The end hook is the easiest to make. The method of producing it is shown at A, Figure 2.

With the round-nose pliers, make almost a closed loop (2), then make almost a right-angled bend (3). The last bend (4) may be made as shown, or it may be made into a flat loop to rest flat on the motor stick, or it may be bent 180 deg. in the opposite direction and rest on top. For all usual purposes, the one shown is best.

The propeller shaft is next easily made. It is shown at B, Figure 2.

Make almost a complete loop at the end (2), then a partially reverse (3) so the loop appears exactly balanced on top of the straight shaft. After the bearings (beads or washers) are on this shaft and the shaft is through the propeller hub, then make the final bend as shown (4), and pull the end (5) back into the propeller wood, there to be glued permanently and straight.

The S-hook requires five bends with the round-nose pliers. It is shown at C, Figure 2.

First bend the wire back a trifle, as shown at (1), then entirely around (2), then make a reverse bend (3) to obtain the S appearance. The final two bends (4) and (5) hide the needlelike sharp point at the end of the wire.

The propeller shaft bearing shown at D, Figure 2, is the most important single wire unit on the entire airplane. It must be made exactly right, and placed in the proper position on the motor base, with its face (5) exactly in line with the motor base, and at right angles to it, so the propeller will run true when in flight. The wire is held perfectly still, while the bending motions are made with the hand holding the round-nose pliers.

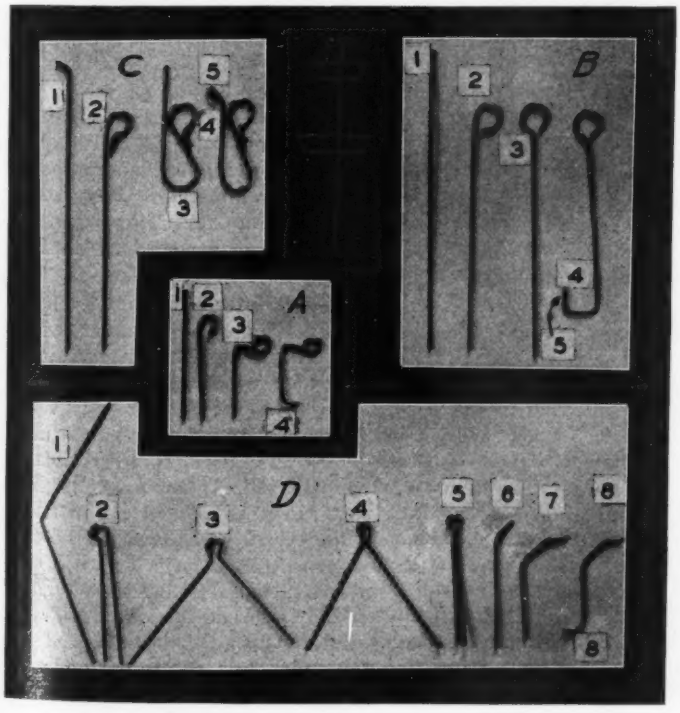


FIG. 2
The endhook is shown at *A*, the propeller shaft at *B*, the S-hook at *C*, and the propeller-shaft bearing at *D*.

Almost a right angle (1) is first made about an inch from the end of the wire, then a complete reversal occurs (2), followed by a slight bend exactly equal to the first, thereby making (3) an open cotter pin. Next place a wire through the open hole, and squeeze the neck entirely shut (4). Grasp the head of this cotter-pin-like wire bearing, with the flat jaws of the side-cutting pliers, and pull the two legs of the wire together (5) so the head sits exactly balanced on the top. Turn the wire 90 deg. around, and bend *only* the head (open eyelet) about 30 deg., that is, a third of a right angle (6), then make a 60-deg. bend about ¼ in. back (7). The final bend (8), at the end, completes this bearing.

Try this ten times with iron wire, until the curves are produced exactly and in the order given. Then and then only try it on steel wire. Some junior aviators flatten out a 1-in. brad, make a drilled hole in it like (5), and bend it as in (6), (7) and (8), and get very good results.

Motor Base Making

Three kinds of motor bases may be used. They should be made of some soft, light, and straight-grained wood.

The first kind sustains strong motors, and is made with the same cross section from end to end. That is, the width may be ⅛ in. and the thickness ¼ in., or it may be 3/16 in. square.

A second shape is for a slightly weaker motor. Such a motor may be used with the hope of achieving greater duration because of the reduced weight. This motor base has the same cross section at the rear (or propeller end) and tapers on both sides gradually to the end where it is perhaps 1/16 in. wide on top and bottom.

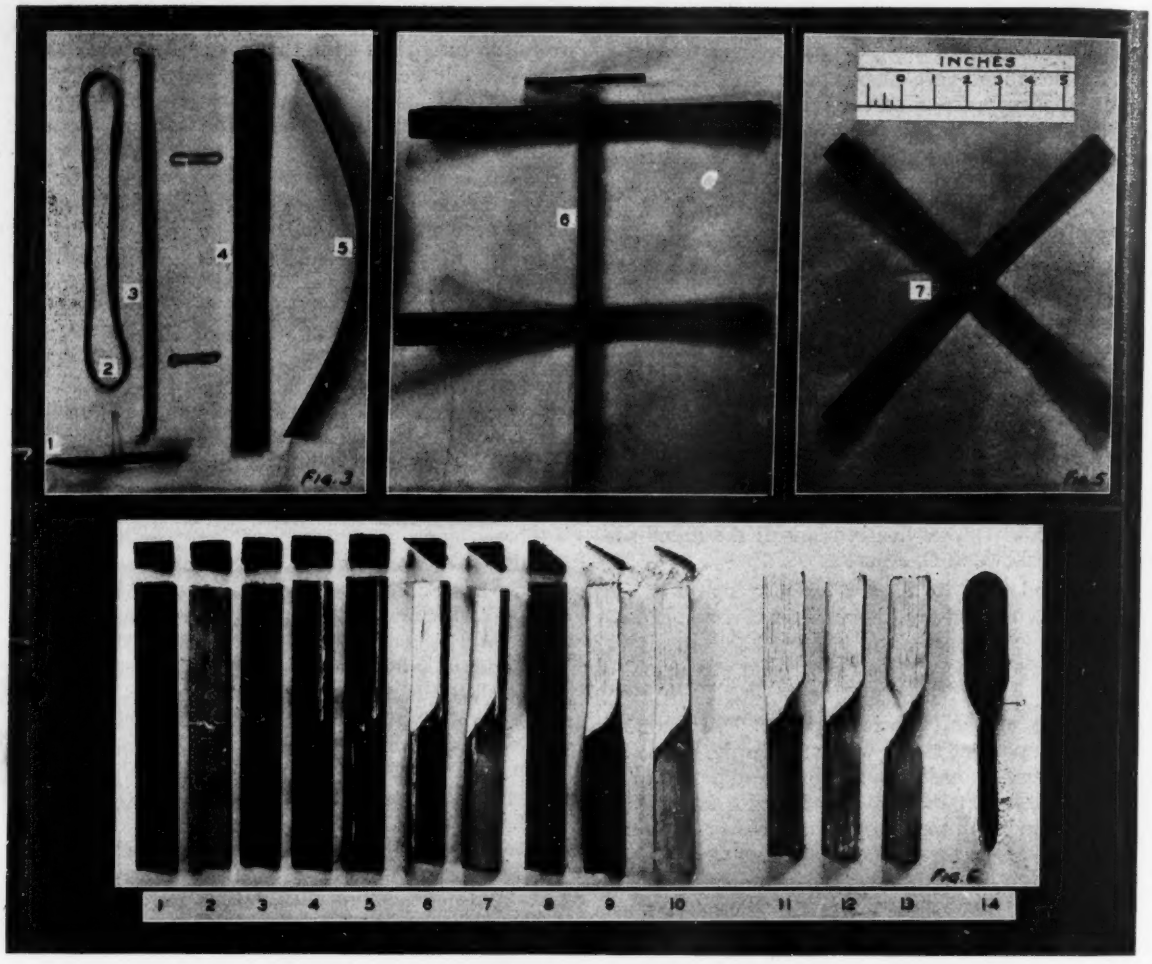
A third shape is designed for the weakest motor that will fly an airplane of given length and given area of wing and tail. The motor base is tapered on all four sides from the propeller and down to the end hook end where it is sometimes but ⅛ in. square.

The motor base (3), Figure 3, measures 3/16 by 3/16 by 12 in. The wire propeller shaft bearing is attached to one end, on top, by means of cement or glue, tied with 8 or 12 turns of silk thread, half the turns exactly at the *end* of the motor stick, and half the turns exactly covering the other end of the wire part. If the motor base has been made tapering for a weaker motor, the bearing is placed at the heavy end. The end hook is attached at the further end in a similar manner, with thread and cement. Be sure the hook and bearing appear on the same *edge* of the motor stick.

Wing Making

Three kinds of wings can be used on any of these simple airplanes. They are described in the order of their suitability for quick flight.

Flat wood wings of the lightest, straight-grained wood obtainable, cut to size and warped in dihedral without any angle of incidence. If pine, basswood, spruce, or cedar is used for the wings, the thickness should be less than 1/16 in. If balsa wood is used, generally 1/16 is sufficiently thin for



THE SCALE SHOWN ON FIG. 5 MAY BE USED ALSO ON FIGS. 3 AND 4

first trials, although the balsa wings may be made as thin as 1/20 in.

Flat wood-and-tissue wings generally are made of round bamboo spars and braces, covered with tissue paper. These wings are made about the same shape and size as the wood wings. Sometimes softwood of ⅛ in. square cross section is used instead of bamboo. Balsa spars, with bamboo tips and braces, have been found best in the most fragile types of planes.

Double-covered wings, or wings with a known airfoil, may be shaped with balsa ribs, spruce spars, bamboo rim, and tissue covering. Excellent flights have been made with solid balsa wings, that have been scraped down accurately to the desired airfoil.

Propeller Making

One simple method of propeller making will give the base processes for making many other types of propellers. Some propellers begin with a rectangular block, with thickness and width the same throughout the entire length; and other propellers have diamond points, rounded ends, narrow-waist, or knifelike blades of varying pitch.

Regardless of the shape of the finished propeller, after the block shape is once obtained, the following process of carving is the one usually followed.

Numerous experiments reveal that an oblong propeller block should have a thickness that is two thirds of its width, and a length which is 6 2/3 to 13 1/3 times the width. That is, to make a good all-around propeller out of a block which is ¾ in. wide, its thickness should be ½ in. and its length from 5 to 10 in. There are other cross-section formulas which are good, but this one is quite satisfactory.

When the block is properly squared as at (1), Figure 6, put in the center mark (2) on one side and then on the other side, (3) the center is where the two middle intersect, half way from side to side and half way from end to end. Drill a tiny hole exactly through at right angles to each face (¾ by 5 in.). Make a narrow line from the end along the edge (4) to the center, then turn the block from end to end and (5) make another line exactly the same way. Now carve from one of these lines (6) from near the center hole, down to the end and the edge of the opposite side. Turn the block end for end, without turning it over, (7) and carve off the top half of the other blade in exactly the same manner. Turn the block (8) over. No lines are made on this side. Carve from near the center hole (9) to the end and edge of the opposite side. Turn the block from end to end (10) and carve the other blade likewise. The propeller shaft with thrust bearing (beads or washers)

FIG. 7. Right to left, Baby Plane, Buzzy Plane, and Sonny Plane. All similar, but of different sizes.

FIG. 8. Bob, age 13, putting airplane wing in position. Notice that the rubber band is held by both hands so that it does not touch the wing as the latter is slid into position. Two hands being busy with the rubber band, and having no playmate handy to hold the wing, Bob holds the wing with his teeth.

FIG. 9. Bob uses the egg-beater motor winder. A tree crotch, a bench vise, or an adult can hold the propeller during the winding process. Photos by Professor M. L. Byrn, Ann Arbor, Mich.

may now be thrust through the hole, cemented, the end of the shaft bent and brought back into the propeller block, and left to dry. It will in this form be the simplest-known propeller.

If you desire to make the propeller still lighter, cut out the hub (11), Figure 6, parallel to the shaft hole on one side (12), then on the other side (13) and smooth down the surfaces diligently with sandpaper, reducing the blades to paperlike thinness, round the ends (14) balance on the propeller shaft to be sure the blades are of equal weight, then cement the propeller shaft in place as before mentioned.

Generally the p r o p e l l e r in the duration type should not weigh more than 1/10 of the entire weight of the airplane.

Airplane Making

Figure 4 shows the baby plane, one of the world's simplest airplanes. It has been made complete within 15 minutes, and flies from 20 ft. up to 150 ft. It consists of four pieces of wood—two wings, a motor stick and propeller; three pieces of wire—bearing, endhook, and propeller shaft; thrust bearings; two rubber bands to hold wings to motor stick; cement and thread for attaching wire parts; and a 4-strand para-rubber motor.

The lightest straight-grained wood available is used for the wings and propeller, while spruce or basswood is best for the motor stick which is 3/16 in. square and 12 in. long. The wings are the same as used on the boomerang (Fig. 5). They measure 1/16 by 1 by 12 in. The propeller is ¼ by ⅜ by 4 in.

Figure 3 shows the component parts of the airplane.

1. The propeller
2. The motor
3. The motor base with wire parts mounted
4. Top view of wing
5. Wing's dihedral
6. On Figure 4 shows the completed plane, ready to fly
7. On Figure 5 shows a boomerang made of the plane wings.

The motor is attached from the endhook to the loop of the propeller shaft.

Wind this motor so that the wind blows back and away from the plant when the propeller is released. The propeller may be cut either right or left. Wind it 100 turns, then hold it high above the head and throw it into the air, with the propeller last. If it loops, pull the front wing back toward the propeller a trifle. If it dives, either put a match stick under the trailing edge of the front wing, or pull the front wing forward a little bit. The wings are *under* the motor stick, and the motor is *over* the motor stick.

Dimensions for making four airplanes of the same type, all made in the same manner as the one just described, and all flying as pushers with propeller last are shown in the following table.

The little one is 12 in. long, the second, 21½ in., the third 26 in., and the fourth, 40 in.

Three of these airplanes are shown in Figure 7.

The tiniest of these, the Baby, is made small and sturdy to withstand much handling. It flies from 20 to 100 ft. When made very light, it may fly as far as 150 ft.

AIRPLANE DIMENSIONS

	BABY	BUZZY	SONNY	DADDY	
Motor Base At Front At Rear Length	3/16 x 3/16 3/16 x 3/16 12	1/8 x 1/8 1/4 x 1/4 21 1/2	1/8 x 1/8 1/4 x 1/4 26	1/8 x 3/16 3/16 x 3/8 40	
Propeller	1/4 x 3/8 x 4	1/2 x 3/4 x 5	1/2 x 3/4 x 6	1/2 x 3/4 x 9	
Wing	1/16 x 1 x 12	1/32 x 2 1/4 x 15 1/2 and 18	1/16 x 2 1/4 x 18 1/2	1/16 x 2 1/4 x 24	
Elevator	1/16 x 1 x 12	1/32 x 2 1/4 x 5 1/2 and 8	1/16 x 2 1/4 x 10	1/16 x 1 x 12	
Motor, 1/8 Flat Rubber Strands Length Per Strand Total Length	4 11 44	4 21 84	4 25 100	6 39 1/2 237	8 39 1/2 316
Turns in Motor	100 to 175	250 to 400	300 to 500	700 to 1200	500 to 1000
Approximate distance between front edge of wing and front end of motor base	5	9 1/2	11		
Weight of plane in ounces	1/3	1/3	1/2	2/3 to 1 1/4	

Note: Tips of wings, elevators, and propellers may be slanted back at the same angle. The shorter edge of the wing should cut the wind first. Wing tips may be rectangular, oval, eliptical, parabolic, etc.
All dimensions in above table are in inches.

The Buzzy plane, when made to weigh ½ ounce, flies well under average conditions. It may be made lighter for flying indoors.

The Sonny plane, being larger, will proceed even against rather heavy winds. It also may be made lighter for flying longer distances.

The Daddy plane, dimensions for which are given in the table, being the sturdiest, can be depended upon for the best service.

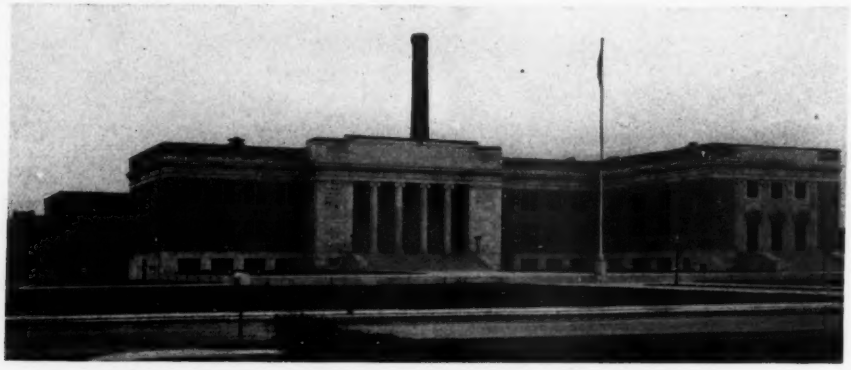
The Camden County Vocational School

CAMDEN County, N. J., can justly be proud of the new vocational school, which it has erected on Browning Road, Pennsauken township, between Marlton Pike and Merchantville. This school with its Greek Ionic exterior is an imposing sight to the visitor who approaches it along the broad cement walk.

The building is constructed of steel and concrete with an exterior facing of limestone and buff brick, and a limestone trim. The over-all dimensions of the school are about 239 by 147 feet, the principal frontage being the greater dimension.

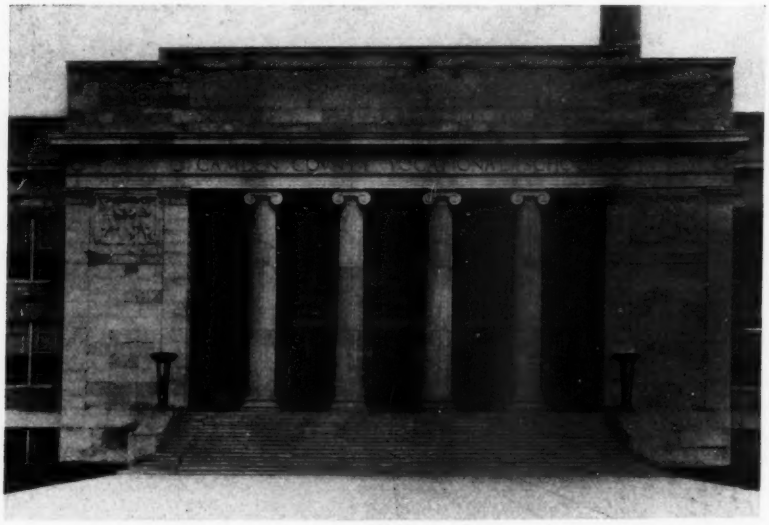
The building consists of two stories and a basement. The school consists of 15 classrooms, 10 shops, and 2 laboratory rooms. The auditorium has a seating capacity of 1,200 and measures 61 by 147 feet. The 60 by 81-ft. gymnasium has seating capacity for 700. The school also is provided with a 30 by 60-ft. swimming pool. The heating and ventilating equipment is of the vapor system type with Johnson Service temperature control. The cost of the ground and buildings is about $851,000, while the equipment cost $131,000.

In the basement are the cafeteria and the kitchen, the boiler room, and the swimming pool.



EXTERIOR, CAMDEN COUNTY VOCATIONAL SCHOOL, CAMDEN, N. J.

On the first floor are the auditorium, the general office, seven classrooms, the physical director's office, and the gymnasium. In the shop portion of the building on the first floor are the machine shop, the auto shop, farm mechanics and heating and ventilating shop, the carpentry and millwork shop, and the trowel-trades shop.



ENTRANCE DETAILS, CAMDEN COUNTY VOCATIONAL SCHOOL, CAMDEN, N. J.

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MAY, 1929.

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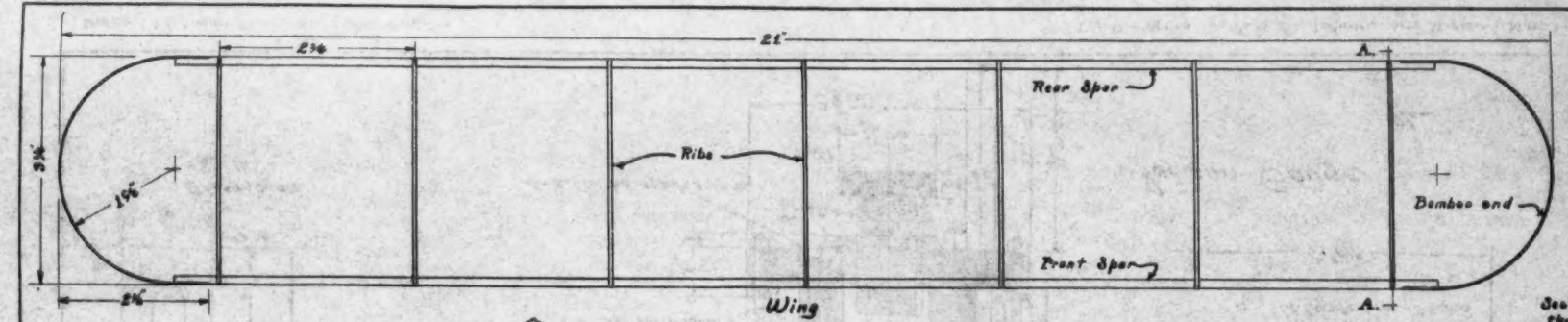
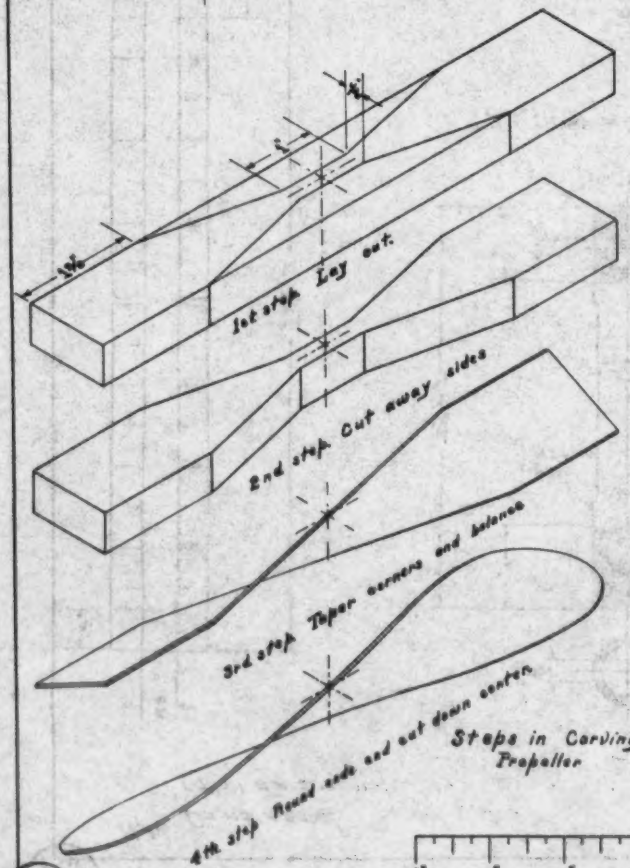


Wing

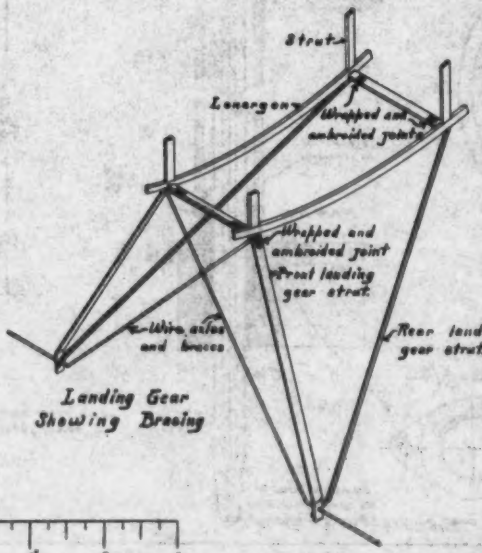
Section A-A thru rib

Wing Shape After Covering and Applying Banana Oil
— ½ Scale —

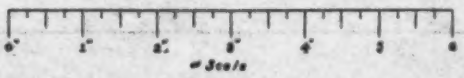
Note: Warp up leading edge of wing on left side for counterforque to overcome torque of propeller.



Steps in Carving Propeller



Landing Gear Showing Bracing



Bill of Material

Item	Material	T	W	L	Amt.	Remarks
Fuselage longerons	Balsa Wood	1/16	1/16	16	4 pc.	straight grained
" struts	" "	1/16	1/16	16	2 pc.	" "
" Rear end	" "	1/16	3/16	3/16	1 pc.	" "
Radiator	" "	3/16	1	1¾	1 pc.	" "
Motor Stick	" "	3/16	1/16	14	1 pc.	" "
Wheel Rims	" "	1/16	2	2	2 pc.	" "
Propeller	" "	9/16	1¾	8	1 pc.	" "
Wing spars	" "	1/16	1/16	17	2 pc.	" "
" Ribs	" "	1/16	3/16	3/16	7 pc.	" "
" ends	Bamboo	1/16	1/16	6	2 pc.	straight
Stabilizer	"	1/16	1/16	11	2 pc.	"
" braces	"	1/16	1/16	4	6 pc.	"
Rudder	"	1/16	1/16	10	1 pc.	"
" braces	"	1/16	1/16	3	3 pc.	"
Tail skid	"	1/16	1/16	2	1 pc.	"
Lead gear front S.	"	1/16	1/16	5	1 pc.	"
" " rear S.	"	1/16	1/16	10	1 pc.	"
Covering	Jap. Rice Paper				1 sh.	16" x 24" sheet
Banana Oil					4 oz.	
Ambroid Cement					2 oz.	
Wire fittings	Piano Wire				2 ft.	No 11 (1/8")
Motor	Para Rubber				50"	¼ flat rubber
Washers	Aluminum				2 each	30 gauge sheet

FLYING MODEL
MONOPLANE
21" Wing Spread

No Sheets 2
Sheet No. 2
Designed by E.L. Smith
Date. 1/5/29

UNIV. OF IOWA

Designed by Erwin L. Smith, Waterloo, Iowa.

For Description See Page 191, Industrial-Arts Magazine, May, 1929.

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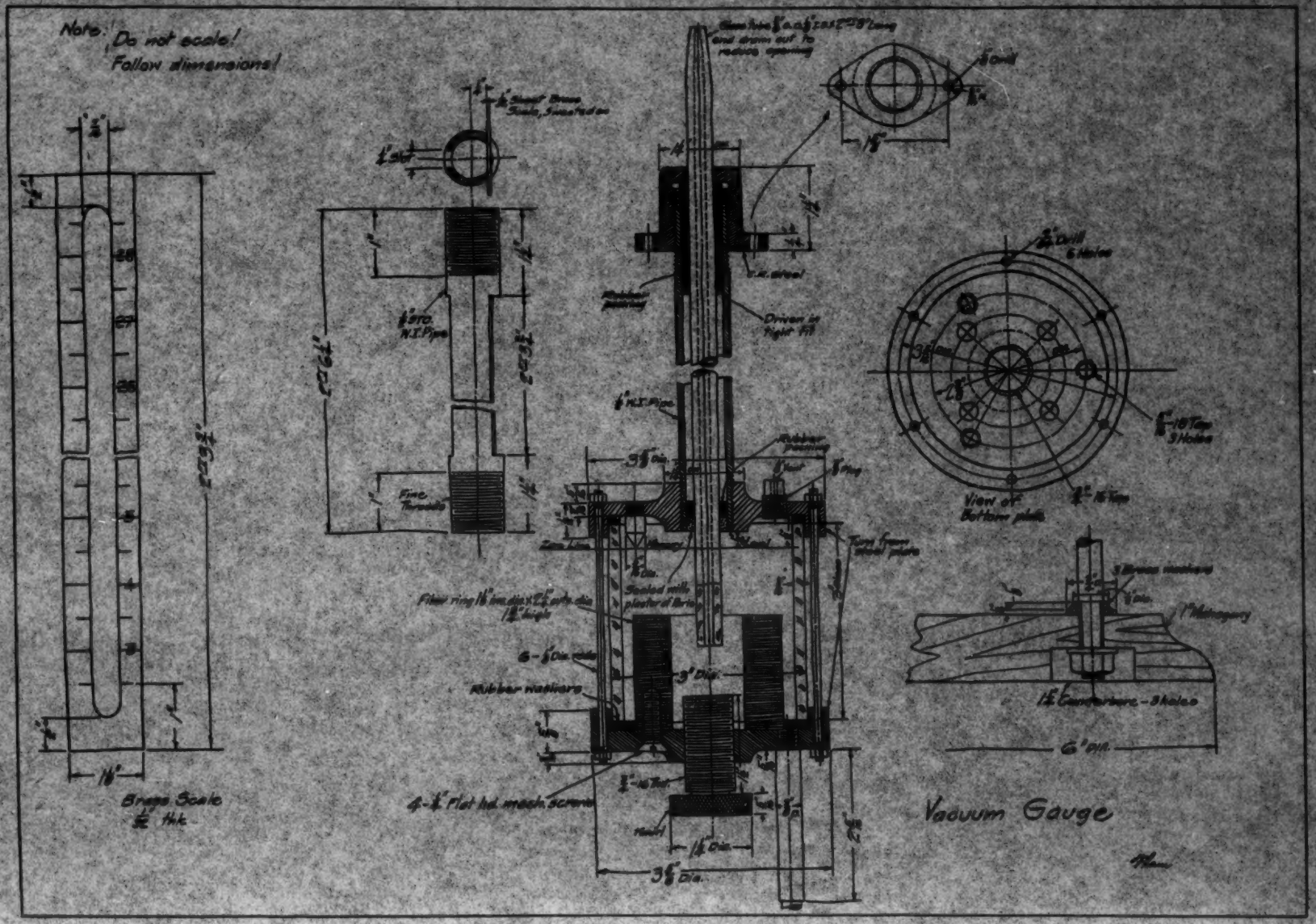

Designed by August Flem, Los Angeles, Calif.

For Description See Page 199, Industrial-Arts Magazine, May, 1929.

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THE INDUSTRIAL-ARTS MAGAZINE,
MAY, 1929.

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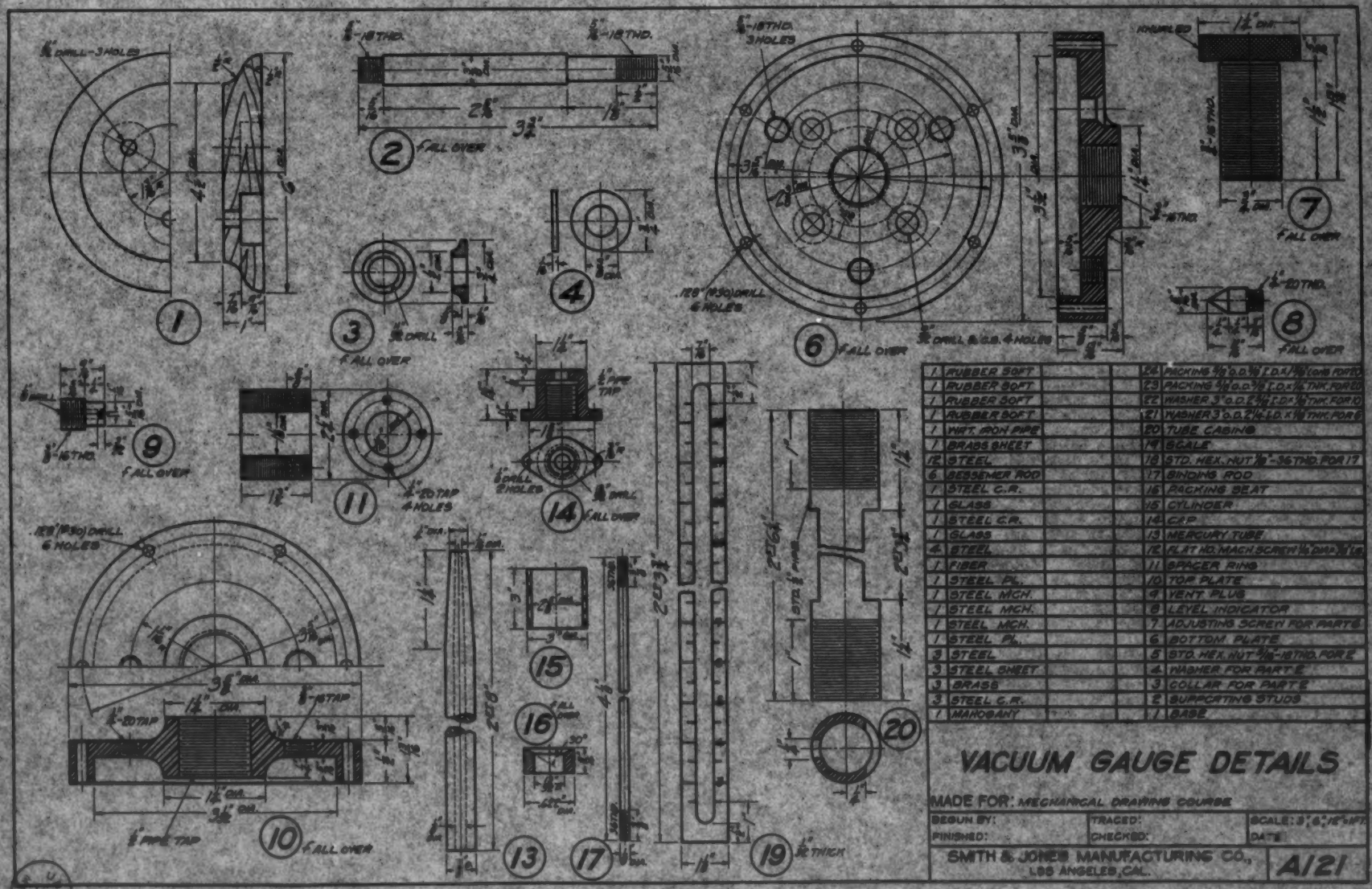

1	RUBBER SOFT		24	PACKING 5/8 O.D. 3/8 I.D. 1/16 CORE FOR 20
1	RUBBER SOFT		23	PACKING 5/8 O.D. 3/8 I.D. 1/8 THK. FOR 22
1	RUBBER SOFT		22	WASHER 3" O.D. 2 1/4 I.D. 1/8 THK. FOR 10
1	RUBBER SOFT		21	WASHER 3" O.D. 2 1/4 I.D. 1/16 THK. FOR 6
1	WRT. IRON PIPE		20	TUBE CASING
1	BRASS SHEET		19	SCALE
12	STEEL		18	STD. HEX. NUT 1/8"-36 THD. FOR 17
6	BESSEMER ROD		17	BINDING ROD
1	STEEL C.R.		16	PACKING SEAT
1	GLASS		15	CYLINDER
1	STEEL C.R.		14	CAP
1	GLASS		13	MERCURY TUBE
4	STEEL		12	FLAT HD. MACH. SCREW 1/8 DIA. 3/16 LG.
1	FIBER		11	SPACER RING
1	STEEL PL.		10	TOP PLATE
1	STEEL MCH.		9	VENT PLUG
1	STEEL MCH.		8	LEVEL INDICATOR
1	STEEL MCH.		7	ADJUSTING SCREW FOR PART 8
1	STEEL PL.		6	BOTTOM PLATE
3	STEEL		5	STD. HEX. NUT 3/16"-18 THD. FOR 2
3	STEEL SHEET		4	WASHER FOR PART 2
3	BRASS		3	COLLAR FOR PART 2
3	STEEL C.R.		2	SUPPORTING STUDS
1	MAHOGANY		1	BASE

VACUUM GAUGE DETAILS

MADE FOR: MECHANICAL DRAWING COURSE

BEGUN BY:	TRACED:	SCALE: 3", 6", 15" to FT.
FINISHED:	CHECKED:	DATE

SMITH & JONES MANUFACTURING CO., LOS ANGELES, CAL. A121

Designed by August Flam, Los Angeles, Calif.

For Description See Page 199, Industrial-Arts Magazine, May, 1929.

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Notes

Cut all balsa stripe and sandpaper to exact size. Split bamboo and scrape to exact size. Bend bamboo over candle flame to shapes required. Fasten all joints with ambroid cement and tie with thread where necessary. Cover with rice paper using banana oil to stick paper on. Coat all covering except stabilizer and rudder with banana oil. Size propeller several coats of banana oil. Fasten wing on with small rubber band. Place 4 strands of rubber on motor stick and give propeller about 150 turns clockwise. Adjust wing forward or backward until plane flys smoothly.

Propeller Shaft

Front Bearing

Rear Hook

S-Hook

Washer aluminum

Radiator Pin

Motor Stick Clip

Tail Skid — Bamboo

Perspective showing assembly of parts

Stabilizer

No. ⅛" Bamboo

No. 1/16 Struts

No. 1/16 Struts

No. 1/16 Struts

Rudder

No. ⅛" Bamboo

Wing Rib

No. 1/16 Upper Longeron

No. 1/16 Motor Stick

Rubber Motor 4 strands ⅛" flat rubber

No. 1/16 Struts

No. 1/16 Struts

No. 1/16 Struts

No. 1/16 Lower Longeron

Front Strut No. ⅛ bamboo

Rear Strut No. 1/16 bamboo

Wheel Section showing Washer Bearings

Balsa Rim

Paper Disc

Scale

FLYING MODEL MONOPLANE

21" Wing Spread

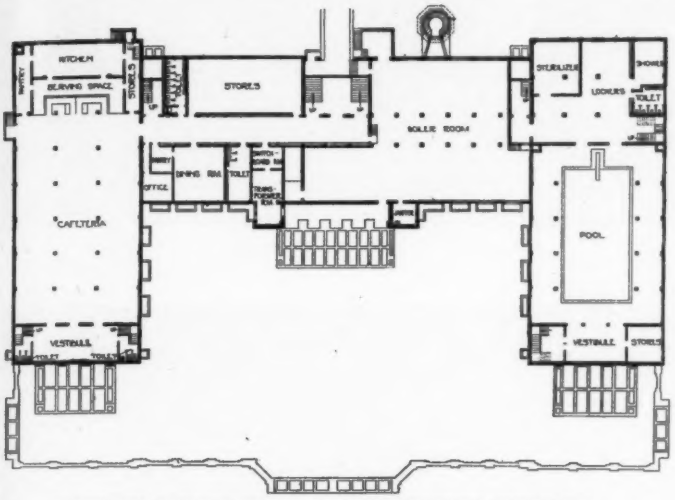
No. Sheets.— 2.
Sheet No.— 1
Designed by E. L. Smith
Date. 1/5/29.

Designed by Erwin L. Smith, Waterloo, Iowa.

For Description See Page 191, Industrial-Arts Magazine, May, 1929.

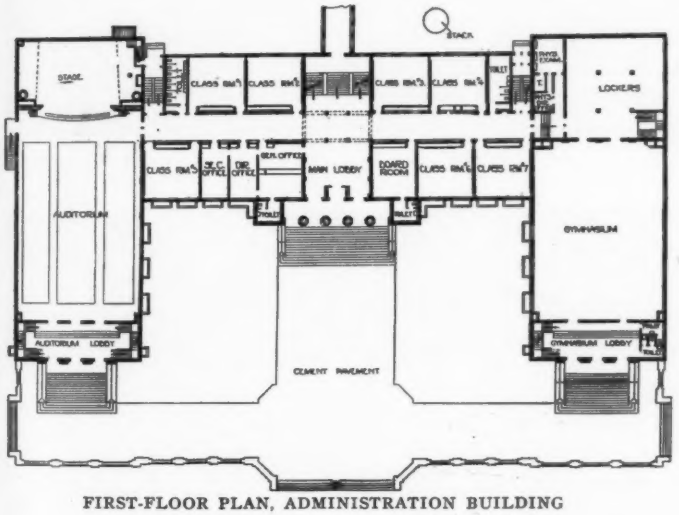
On the second floor are six more classrooms besides the chemistry laboratory, the physics laboratory, and the mechanical- and architectural-drafting rooms. In the shop portion on this floor are found the printing shop, the painting, interior decorating, and wood finishing shop; the plumbing and drainage shop, the electrical-wiring shop, and the general electrical shop.

The pupil capacity of the building is 1,000, and the purpose of the school is to prepare boys for entrance into the skilled trades. In order to adapt the edu-

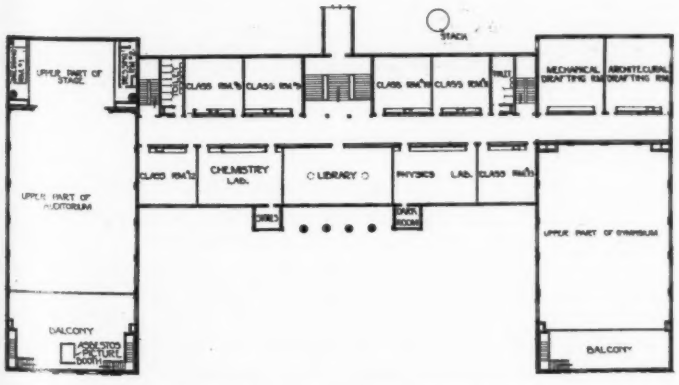


BASEMENT-FLOOR PLAN, ADMINISTRATION BUILDING

SECOND-FLOOR PLAN, SHOP BUILDING



FIRST-FLOOR PLAN, ADMINISTRATION BUILDING



SECOND-FLOOR PLAN, ADMINISTRATION BUILDING

FIRST-FLOOR PLAN, SHOP BUILDING

For Description See Page 191, Industrial-Arts Magazine, May, 1929.

cational facilities to the needs of the community, advisory committees made of representatives of industrial plants, employer organizations, and labor organizations work with the school administration in determining the courses of instruction and the equipment that is required to teach these courses.

Day courses cover a period of two years of ten months each. Fifteen to twenty hours per week are devoted to practical shopwork and ten to fifteen hours per week to technical and general education. Besides the day classes, an evening-school program has been laid out, the objective of which is to give trade-extension work to persons who are employed in specific trades or industrial occupations. In the evening school, men employed in one trade will not be permitted to enroll for instruction and courses pertaining to other trades. The evening-school courses take special care of the apprentice situation and the various trades will be outlined so that apprentices therein can receive instruction throughout their entire period of apprenticeship, be that period three, four, or five years in length.

The school is prepared to offer apprentice courses in the following trades:

Auto mechanics
Bricklaying
Carpentry
Electrical wiring
Electrical machinery repair and operation
Machine-shop practice
Millwork
Painting, interior decorating, hardwood finishing, paperhanging, and sign painting
Plastering
Plumbing and sanitation
Printing
Sheet-metal drafting, layout work, and shop practice
Steam fitting
Structural iron work
Tile laying

GYMNASIUM, CAMDEN COUNTY VOCATIONAL SCHOOL, CAMDEN, N. J.

PRINTSHOP, CAMDEN COUNTY VOCATIONAL SCHOOL, CAMDEN, N. J.

MACHINE SHOP, CAMDEN COUNTY VOCATIONAL SCHOOL, CAMDEN, N. J.

The trade courses offered for the full-time day student are the following:

Auto mechanics
Cafeteria and restaurant operation and management
Architectural and machine drafting
Electrical wiring and electrical machine operation and maintenance
Floriculture and landscape gardening
Industrial chemistry
Machine-shop practice, toolmaking and heat treatment of steel
Painting, interior decorating, hardwood finishing
Plumbing
Printing
Woodworking

VOCATIONAL TRAINING

Vocational training provides for the use of the margin of a man's or a woman's life. Vocational education makes two blades of grass grow where one grew before; it teaches the youth that more efficient work can be performed with sharp tools than with dull tools, and it sharpens the faculties, not merely to make the worker more productive, but to introduce gladness into the achievement.

Flying Model Monoplane

Erwin L. Smith, Waterloo, Iowa

(See Supplements 134 and 137)

ALMOST interesting as well as educational project for junior-high classes in shopwork at the present time is the model airplane. No subject is more appealing to the real American boy than aviation. This interest may be aroused and strengthened by allowing the boys to construct small flying model planes, and in their spare moments they can study the theory of aviation.

Desiring a model which could be made by beginners and one which would give satisfactory results when completed, I have worked out a small monoplane which weighs one ounce.

This plane takes off the ground, circles around for about sixty seconds and then glides down, making a beautiful three point landing. I will discuss the plane briefly so that anyone who desires may use it as a project in their classes.

The tools required to construct the plane are found in any shop or home and consist of a small block plane, round-nose pliers, pocket knife, razor blade, and a 1/32-in. wire drill. The first step is to obtain the material which is called for in the drawing. This material may be purchased from any model supply company.

After the material has been obtained, the next step is to sketch the various parts upon drawing paper, so that templets are obtained for forming the parts. The dimensions may be obtained by making a scale on a piece of cardboard corresponding to the one in the illustrations. This scale may then be used to measure the drawings.

The fusilage is the first part of the ship to assemble. Build up the sides, and then fasten them together to form the framework. The landing gear is next made and ambroided to the fusilage. After fastening the landing gear the stabilizer is formed by bending bamboo to the required shape over a candle flame, and this also is ambroided to the fusilage.

The next step is the construction of the wing. The ribs are cut to shape from thin balsa wood and ambroided to the two long wing struts. The ends of the wing are then formed by bending bamboo strips and these are ambroided to the ends of the wing struts.

The motor stick, radiator, and propeller are next constructed. The motor stick should be straight grained in order to possess maximum strength. The radiator is carved from a solid piece of balsa wood and ambroided to the motor stick as indicated in the illustration. Next the piano-wire bearing is ambroided in position at the front of the radiator. The propeller is then carved out and extreme care should be taken in order to have it as thin as possible and evenly balanced.

To make the propeller, drill the hole for the shaft, and then place the templet upon the blank and mark out the shape. The carving is carried out in four steps as indicated in the drawing and when the propeller has been thoroughly sanded, it should balance in any position it is placed in regard to its center. The shaft is next ambroided into place on the propeller. Care must be taken to get the propeller shaft true to avoid any wobble in the propeller, which will later affect the flight of the monoplane. When the shaft has become thoroughly set, it is inserted through the bearing in the radiator and four strands of $\frac{1}{8}$-in. flat rubber are installed for the motor. Washers should be placed between the propeller and bearing. The propeller is then wound clockwise and allowed to unwind. It should unwind smoothly and free for a successful flight.

When framework has been completed, it is ready to be covered with rice paper. Coat a section of the framework with banana oil and apply the paper. When dry, the edges may be trimmed off with a razor blade. The wing and rudder are covered on both sides. The entire covering may then be coated with banana oil.

The plane is now complete and ready to assemble for flight. Drill two holes into the fusilage and place the ends of the rudder into them. By placing the rudder at a slight angle, the plane can be made to fly in a circle. The wing is fastened into place with a rubber band and the motor stick may be held in place if necessary by a pin through the top of the radiator. The propeller is then given about 150 turns and the plane placed upon a level surface and released. If it climbs too fast, the wing should be moved back, and if too slowly, move the wing forward. When the proper position of the wing has been determined, the motor may be given 250 or 300 turns and released. The plane should make a smooth, even flight. One of the best places to test the plane is in a gymnasium or auditorium as the least bit of wind will affect its flight because of its lightness.

If a group of boys construct the plane, an excellent contest and display may be carried out. Prizes may be offered to the boy whose plane stays up the longest.

The Home-Workers' Engine Lathe

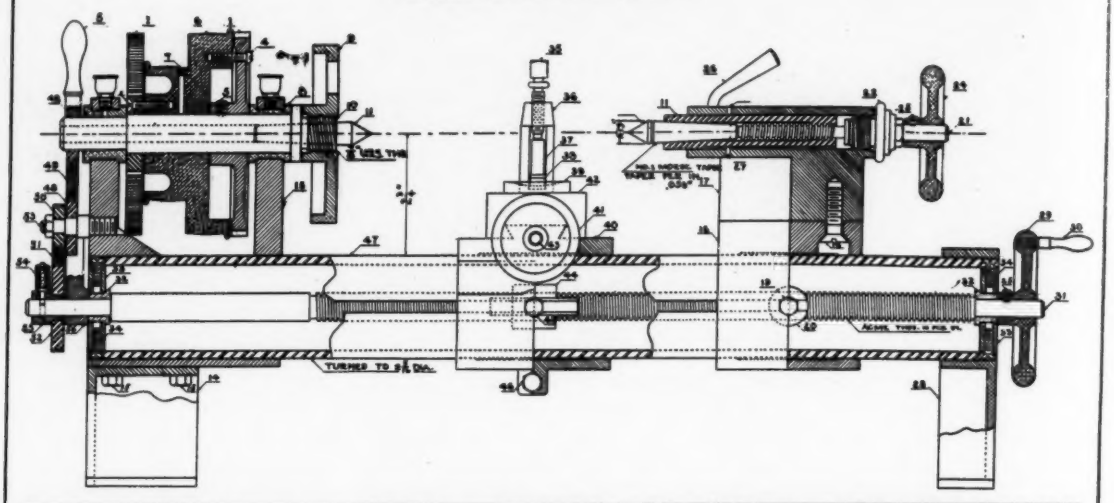
S. L. Coover, Director of Industrial-Arts and Vocational Education, Beaver Falls, Pa.

THIS project combines interest and utility, as well as practically all of the machine and tool processes given in machine-shop courses. In addition it is a "live" problem for the drafting room, pattern shop, and foundry.

Some years ago we adopted the motto, "A home workshop for every boy." The next problem was to get equipment for these shops, which would be useful, but relatively inexpensive. This small engine lathe was designed with these requirements in mind. It has been found very useful for all small work, such as turning armature shafts, commutators, mica undercutting, testing armatures, testing and refacing valves, making bushings, drilling, filing, polishing, and numerous other

ENGINE LATHE

BACK GEARED SCREW CUTTING



NO.	DESCRIPTION	MATERIAL	SIZE	REQ.	NO.	DESCRIPTION	MATERIAL	SIZE	REQ.	NO.	DESCRIPTION	MATERIAL	SIZE	REQ.
1	SPUR GEAR	CAST IRON	4" DIA. 1/2 FACE	2	21	TAILSTOCK SCREW	C.D. STEEL	1/2 DIA. 4 1/2 LONG	1	41	HAND WHEEL	ALUMINUM	2 1/2 DIA.	1
2	" "	STEEL	1/2 P. DIA. 1/2 FACE	2	22	" NUT	" "	1/2 DIA. 1/2 LONG	1	42	CROSS SLIDE	STEEL		1
3	C.S. MACH. SCREW		1/4 X 1/2	1	23	" SPINDLE	" "	1/2 DIA. 3 1/2 LONG	1	43	" " SCREW	C.D. STEEL		1
4	R.H. MACH. SCREW	"	1/4 X 1	3	24	" HAND WH.	ALUMINUM	3 DIA. 1/2 LONG	1	44	LEAD SCREW NUT	CAST IRON		1
5	ADJ. LEVER	C.D. STEEL	1/2 DIA. 3 LONG	1	25	SAFETY SCREW		1/4 X 1/2	6	45	CAP SCREW		1/4 X 1/2	1
6	CONE PULLEY	ALUMINUM	3 4 1/2 DIA. 2 WIDE	2	26	BINDING LEVER	C.D. STEEL	1/2 DIA. 2 1/2 LONG	1	46	" "		1/2	1
7	SET SCREW		1/4 X 1/2	1	27	PIN	" "	1/4 X 1/2	1	47	LATHE BED	2" PIPE	2 X 20 1/2	1
8	SPINDLE BEARING	PHOSPHOR BR.	1/2 HOLE 1 WIDE	2	28	LEG CASTING	CAST IRON		1	48	SPUR GEAR	STEEL	1/2 FACE 30 TEETH	2
9	FACE PLATE	CAST IRON	4 DIA. 3/4 WIDE	1	29	L.S. HAND WHEEL	ALUMINUM	3 1/2 DIA. 3/4 WIDE	1	49	" "	"	" " 18 "	2
10	SPINDLE	C.D. STEEL	1/2 DIA. 6 1/2 LONG	1	30	MACH. HANDLE	C.D. STEEL	1/4 LONG	1	50	" "	"	" " 15-42 "	
11	CENTER	TOOL STEEL	2 1/2 LONG	2	31	LEAD SCREW	" "	1/2 DIA.	1	51	" "	"	" " 24-36 "	
12	REV. GEAR CAST	CAST IRON		1	32	L.S. BEARING	PHOSPHOR BR.	1/2 HOLE	2	52	" "	"	" " 30-60 "	
13	HEADSTOCK	" "		1	33	L.S. SUPPORT	CAST IRON	1/2 HOLE 1/2 THICK	2	53	STUD	C.D. STEEL	1/2 DIA. 1 1/2 LONG	1
14	LEG CASTING	" "		1	34	C.S. MACH. SCREW		1/4 X 1/2	4	54	SPRING CATCH	" "		1
15	CAP SCREW		1/4 X 1/2	2	35	TOOL POST SCR.		1/4 X 1/2	1	55	BUSHING	" "	1/2 DIA. 3/4 LONG	1
16	TAILSTOCK BASE	CAST IRON		1	36	TOOL POST		1/2 X 2 1/2	1	56	IDLER BRACKET	CAST IRON		1
17	" TOP	" "		1	37	" HOLDER			1	57	GEAR AXLE	C.D. STEEL	1/2 DIA. 3 1/2 LONG	1
18	C.S. CAP SCREW		1/4 X 1	2	38	ADJ. SECTOR	STEEL		1	58	ECCENTRIC	" "	1/2 " 7/8 "	1
19	CAP SCREW		1/4 X 1/2	1	39	CONCAVE WSH.	"	1/2 DIA. 1/16 THICK	1	59	SPLIT BUSHING	" "	1/2 " 1/2 "	1
20	SLIDING ANCHOR	STEEL	1/2 DIA. 1/2 WIDE	1	40	SLIDE REST	CAST IRON	1 X 2 1/2 X 2 1/2	1	60	MICROMETER CR.	" "	1/2 " 7/8 "	1

small repair jobs around the home and garage. It is a very useful machine for the model maker.

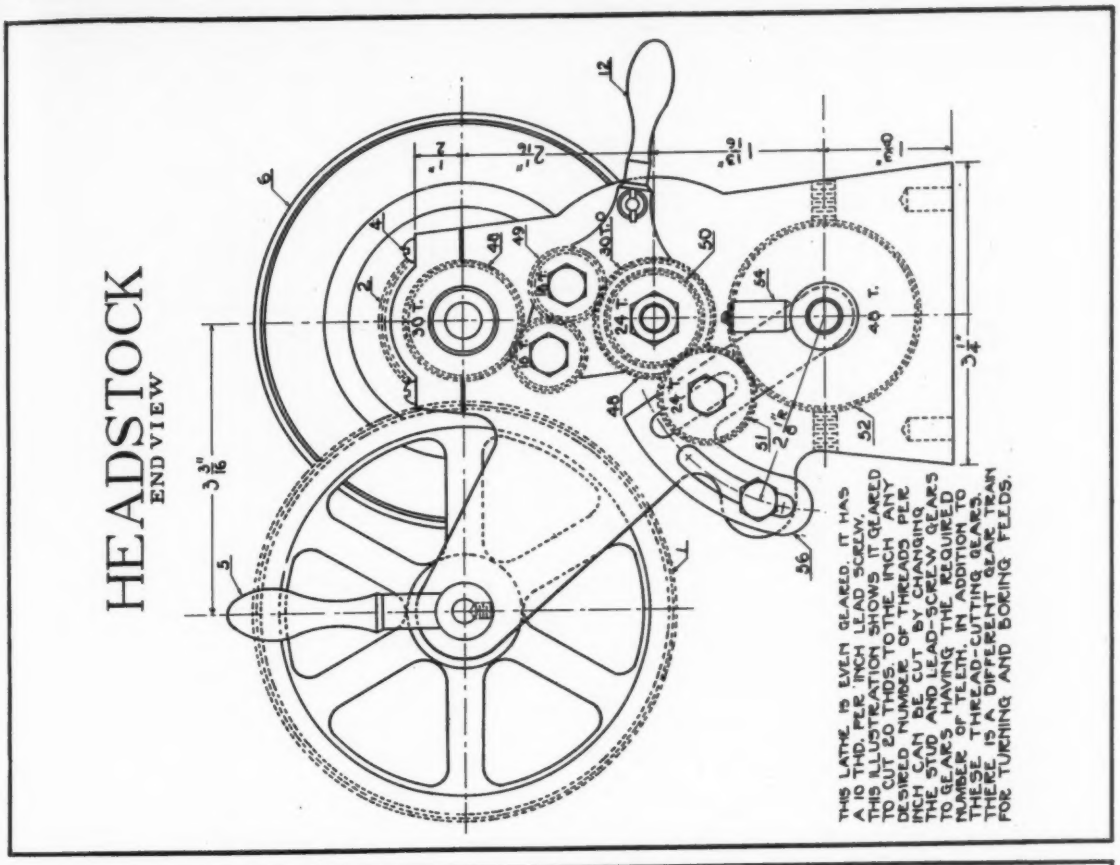
Then too, the possibilities for lathe attachments that the young machinist can make, such as collet chucks, tool-post turrets, grinding attachments, spur centers for wood turning, need only to be suggested.

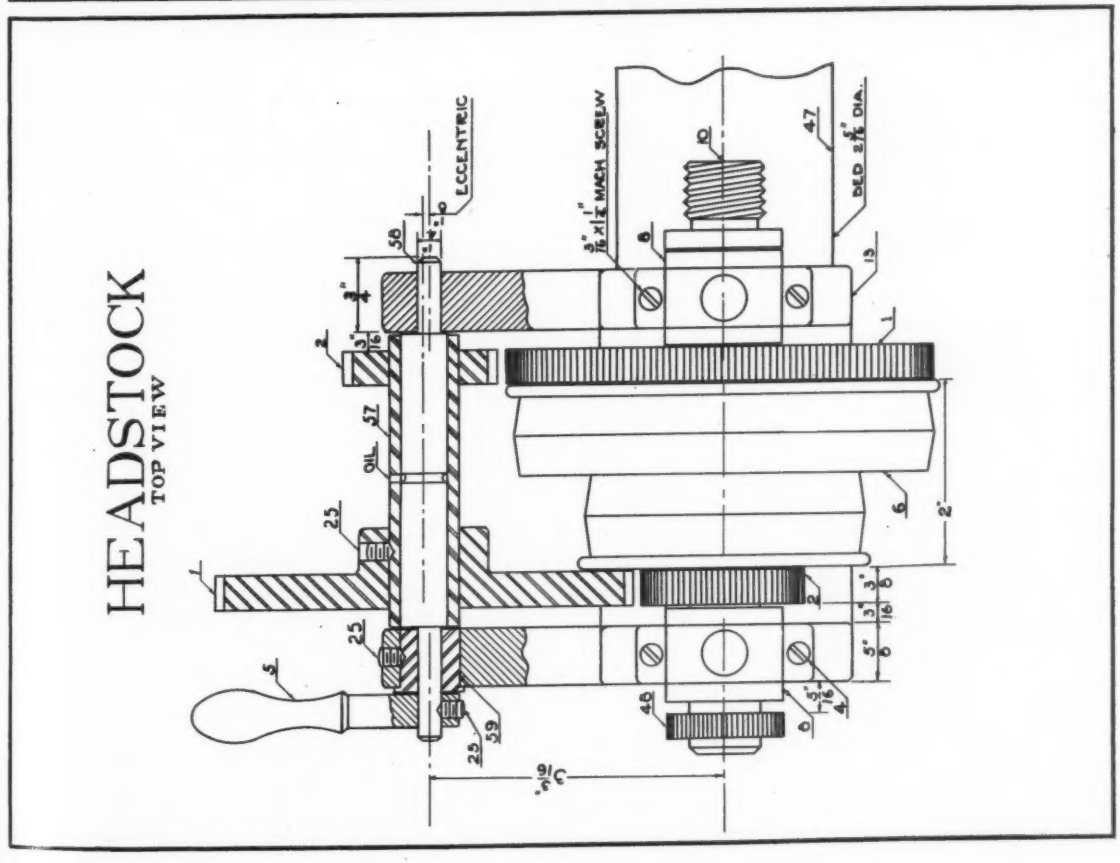
The Lathe Bed. The manner of constructing the entire lathe is shown fully in the assembly drawings. All of the required dimensions will be found either on the drawings or in the list of materials. Dimensions given in this list are finished sizes. The bed is made from 2-in. extra heavy seamless tubing. The piece of tubing is to be cut 3 in. longer than the finished length, and this should not be more than 30 in. Put the tube on the lathe, using the three-jawed chuck and a center rest. Bore the ends to a 60-deg. chamfer to receive the pipe centers. Test the lathe to make sure that it will turn a perfect cylinder instead of a tapered piece. Fasten the dog and cut to size. The finished cut should not remove more than .002 in. Deeper cuts will wear the cutting tool so as to make a noticable difference in the diameter of the tube. Do not remove the tube from the lathe until finished; the additional 3 in. in length allow room for the dog. A difference of .0005 in. or less can be cut down most satisfactorily with emery cloth. If the difference is greater, try another finishing cut. Measure the tube when it is cold for final dimensions. Polish the tube, cut it to the correct length, and mill a 5/16-in. slot beginning 4½ in. from the end and stopping 1½ in. from the opposite end. Drill and countersink the 3/16-in. holes in the ends for the machine screws.

We have found it good practice to make the bed first and then bore the headstock, slide rest, etc., to fit.

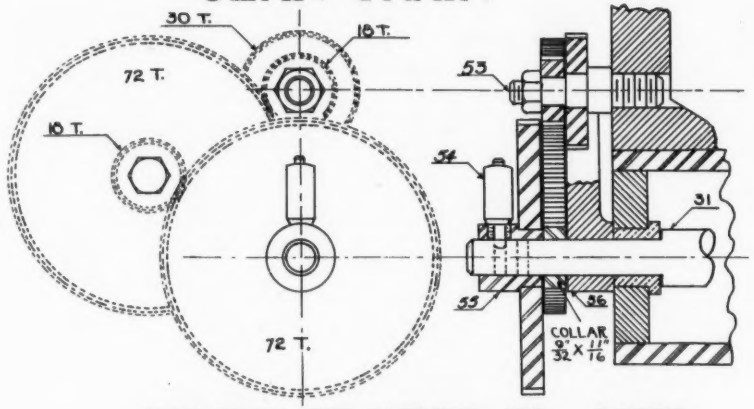
The Headstock. The headstock is cast in one piece. The spindle bearing caps are cast solid with the headstock. The ends of the headstock are finished as shown in the drawing. Bore the holes for the bed so that it is a tight fit. Lay out, bore, and ream the holes for the spindle bearings designated by No. 8 on the drawing and also for eccentric No. 58. Accuracy is a prime requisite in these operations. Never allow more than .005 in. for the reamer to remove. Drill and tap all of the other holes as shown on the drawing. The gear train shown in the end view of the headstock is for thread cutting. The correct speeds for boring and turning are obtained by changing the sizes of gears No. 50 and No. 52. The back-gear arrangement is shown in the top and end-view drawings of the headstock. The method of putting the lathe in high is shown in the section view on the main drawing.

The Tailstock. The tailstock can be cast either solid or in two pieces as shown in the drawing. If it is cast in one piece, do not core the hole for the tailstock spindle. The method of construction is shown fully in the drawing. The part that fits around the bed is


HEADSTOCK
END VIEW
THIS LATHE IS EVEN GEARED. IT HAS A 10 THD. PER INCH LEAD SCREW. THIS ILLUSTRATION SHOWS IT GEARED TO CUT 20 THDS. TO THE INCH. ANY DESIRED NUMBER OF THREADS PER INCH CAN BE CUT BY CHANGING THE STUD AND LEAD-SCREW GEARS TO GEARS HAVING THE REQUIRED NUMBER OF TEETH. IN ADDITION TO THESE THREAD-CUTTING GEARS, THERE IS A DIFFERENT GEAR TRAIN FOR TURNING AND BORING FEEDS.

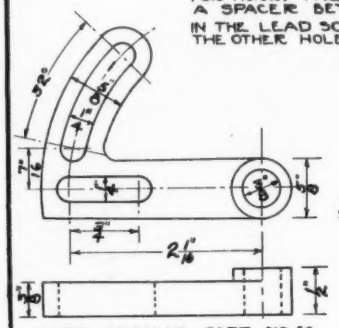

HEADSTOCK
TOP VIEW
ECCENTRIC
OIL

GEAR TRAIN

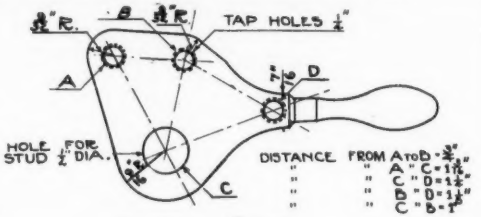


GEAR TRAIN FOR TURNING AND BORING.

THE GEAR TRAIN SHOWN IN THE ASSEMBLY AND HEAD-STOCK END VIEW DRAWING IS FOR THREAD CUTTING. THIS ILLUSTRATION SHOWS THE FOLLOWING CHANGES FOR A SLOW TURNING AND BORING FEED. AN 18 TOOTH GEAR ON THE STUD SUBSTITUTED FOR NO. 50. TWO IDLER GEARS HAVING 18 AND 72 TEETH SUBSTITUTED FOR NO. 51. A 72 TOOTH GEAR ON THE LEAD SCREW SUBSTITUTED FOR NO. 52. THE COLLAR SHOWN ABOVE IS USED AS A SPACER BETWEEN NOS. 55, 56. THE ADDITIONAL HOLE IN THE LEAD SCREW FOR THE SPRING CATCH IS $\frac{3}{32}$" FROM THE OTHER HOLE. ALL GEARS OF THIS TRAIN ARE 24 PITCH $\frac{1}{4}$" FACE.



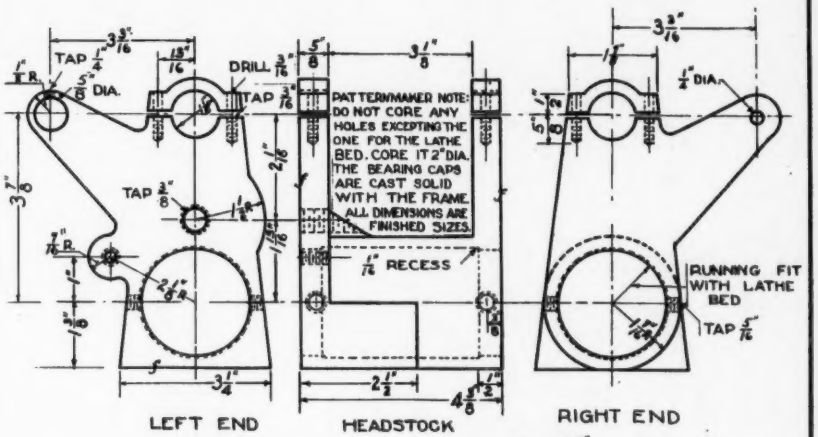
IDLER BRACKET PART NO. 56



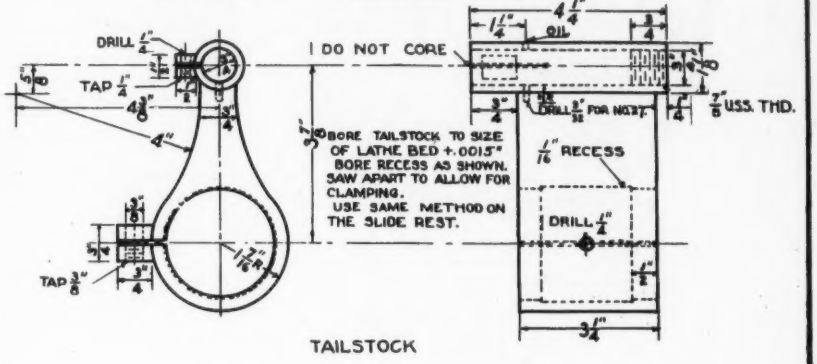
THIS PIECE IS $\frac{1}{4}$" THICK

REVERSING GEAR CASTING PART NO. 12

DETAILS

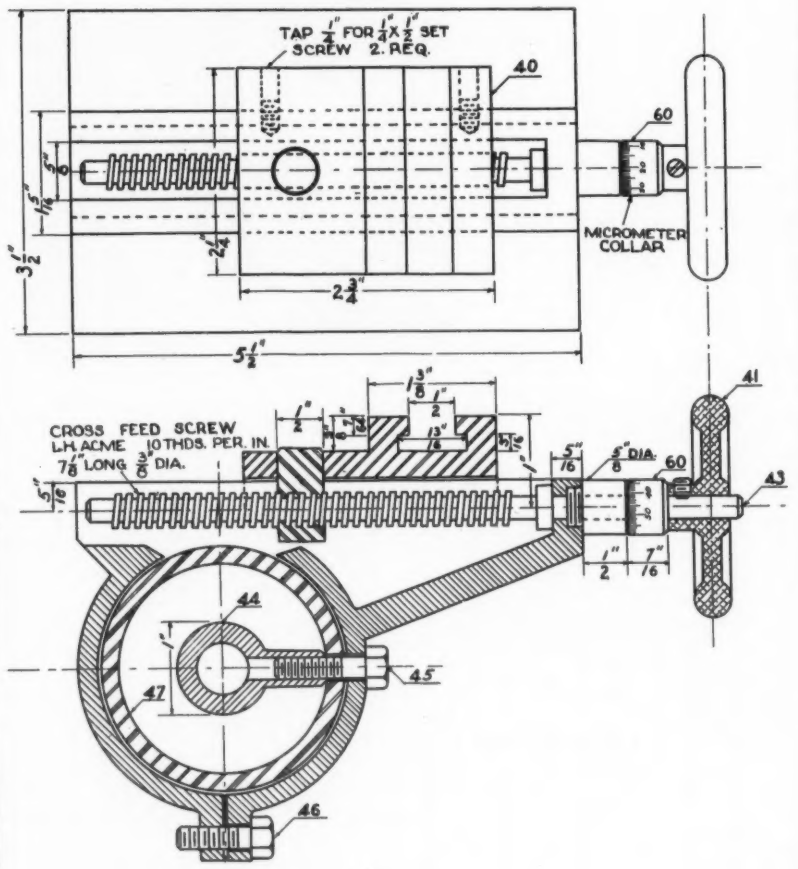

TAP 1/4"
DRILL 3/16"
TAP 3/16"
PATTERNMAKER NOTE: DO NOT CORE ANY HOLES EXCEPTING THE ONE FOR THE LATHE BED. CORE IT 2" DIA. THE BEARING CAPS ARE CAST SOLID WITH THE FRAME. ALL DIMENSIONS ARE FINISHED SIZES.
TAP 3/8"
1" RECESS
1/4" DIA.
RUNNING FIT WITH LATHE BED
TAP 5/16"

LEFT END HEADSTOCK RIGHT END

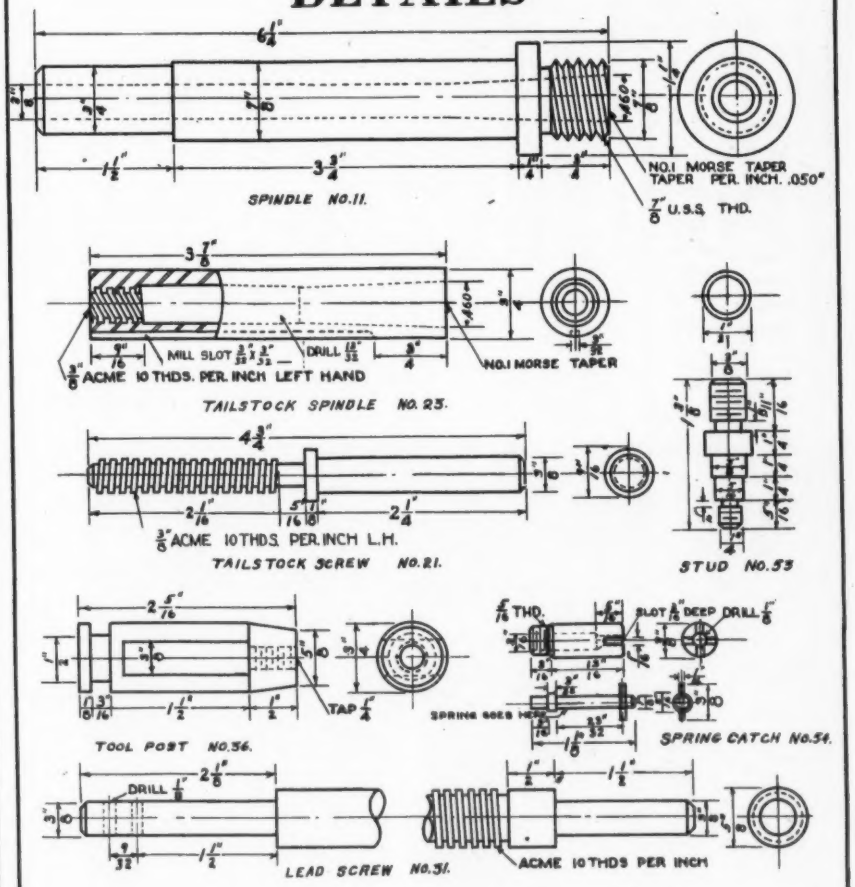

DRILL 1/4"
TAP 1/4"
I DO NOT CORE
7/8" USS. THD.
DRILL 5/32" FOR NO. 37
BORE TAILSTOCK TO SIZE OF LATHE BED +.0015" BORE RECESS AS SHOWN. SAW APART TO ALLOW FOR CLAMPING. USE SAME METHOD ON THE SLIDE REST.
1/16" RECESS
DRILL 1/4"
TAP 3/8"

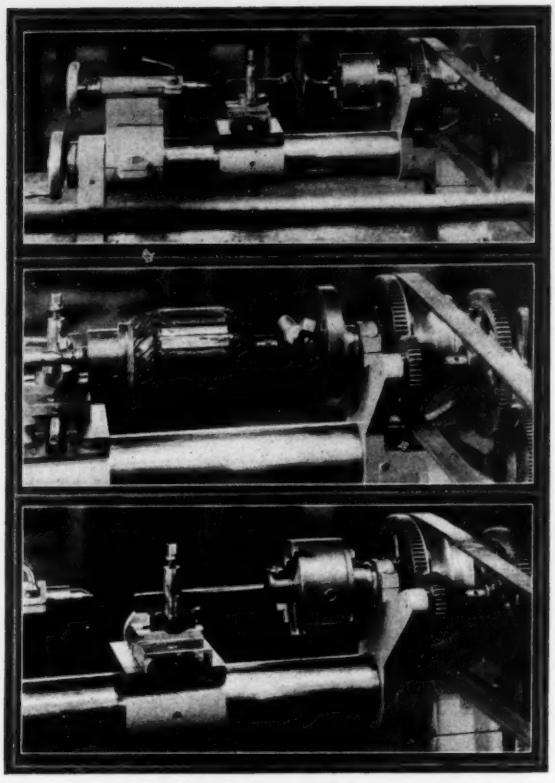
TAILSTOCK

SLIDE REST



DETAILS





EXAMPLES OF WORK PERFORMED ON THE HOME WORKERS' ENGINE LATHE

sawed through on the side opposite the sliding anchor. A cap screw is used for clamping the tailstock to the bed similar to the way the slide rest is clamped. The slide-rest clamp is shown in both the main drawing and in the slide-rest drawing. Note that both the slide rest and the tailstock are bored larger in the center than at the ends to prevent wobbling on the bed. Care must be taken to have the slot in the bed smooth and true so that the sliding anchor No. 20 and the extension on the lead-screw nut No. 44 can be made to fit tight and yet allow the slide rest and the tailstock to slide along on the bed. The tailstock screw has left-hand Acme threads, 10 to the inch.

The Slide Rest. The three views of the slide rest show its construction in all of its details. The tool post is designed to hold small Armstrong tool holders.

The Lead Screw. If the lathe is to be used for thread cutting, the lead screw should have close limits of accuracy. It too, has right-hand Acme threads, 10 to the inch.

Miscellaneous. All small parts not specifically mentioned here are shown plainly in the drawing and in the bill of materials, where all the information necessary for making them is given.

A CHECK LIST FOR SHOP MANAGEMENT AND CONTROL

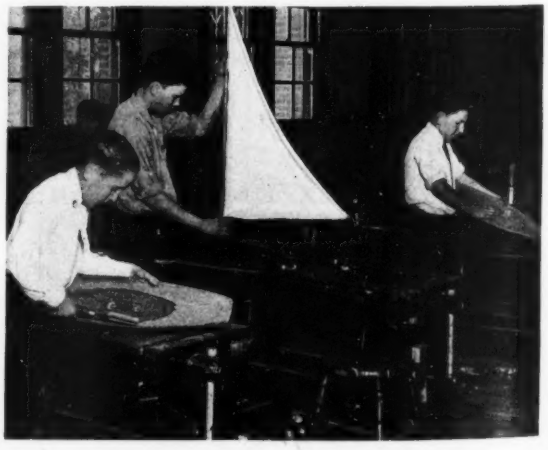
H. John Paustian, Walnut Junior High School, Grand Island, Nebraska

I. *Shop Management.*

1. Tools and tool cabinets:
   - *a*) Are tools within easy reach of all the boys?
   - *b*) Are tools distributed on tool panels so as to avoid congestion at the opening of period?
   - *c*) Is a checking system used so that lost or broken tools may be easily traced?
   - *d*) Are edge tools sharp?
   - *e*) Are all tools in good condition?
   - *f*) Are tools supplied in sufficient number to keep boys from waiting for them?
2. General appearance:
   - *a*) Are floors and benches clean at the beginning and end of the class periods?
   - *b*) Does the room have the appearance of being tidy and well kept?
3. Light:
   - *a*) Does the room have enough light?
   - *b*) Are curtains adjusted to admit enough sunlight?
   - *c*) Are any benches in direct glare of sunlight?
   - *d*) Are the windows clean?
   - *e*) Is artificial light used when needed?
   - *f*) Is artificial light used when not needed?
   - *g*) Are benches so placed that light comes from either right or left side?
4. Heat:
   - *a*) Is the shop kept at the proper temperature by regulating radiators and windows?
5. Ventilation:
   - *a*) Are windows open to provide a constant supply of fresh air?
   - *b*) Are objectionable drafts avoided?

II. *Shop Control.*

1. Details:
   - *a*) Is roll call and attendance report taken without using the time of the class?
   - *b*) Is loud talking and unnecessary noise eliminated?
   - *c*) Is the demonstration longer than fifteen minutes?
2. Materials:
   - *a*) Is every boy supplied with materials and tools all of the period?



MODEL-BOAT BUILDERS
C. A. Kunou, Supervisor Manual Education, Los Angeles, Calif.

PROBLEMS AND PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

A WROUGHT-IRON TABORET

J. W. Bollinger, Tulsa, Oklahoma

The taboret described herewith is made of wrought iron. One way to begin is by making the rings. Use 3/16 by ¾ by 11⅜ in. band iron. This allows ⅜ in. for overlapping the ends at the joint. The joint need not be brazed or welded, but may be riveted with the same rivet which will hold the leg in place. To make the joint smoother, cut half way into the thickness on opposite sides of each end. so that when the ends come together, a kind of half lap joint is formed. The iron for the rings is heated and curved to shape over the anvil.

The next step is to drill three 3/16-in. holes at equal distances around the rings, for fastening the legs in place. One hole must be drilled through the center of the joint in each ring. To locate the other two holes, set a pair of dividers a distance equal to the radius of the rings; set one leg at the center of the hole in the joint, and scratch a line with the other leg. Now move the dividers so that one leg rests in the center of this line, and with the other leg, mark off another line. This line is the center line for the other hole. Repeat this operation in the other direction to locate the other hole. Place the marked ring above the unmarked one, and carry the lines down so that both rings will be marked off exactly alike. Drill the holes.

The legs are made of ⅜-in. square stock, 27 in. long. They may be shaped by bending them over the anvil one step at a time, and comparing them. Where only one taboret is to be made, this is perhaps the best way. But if a number of pupils are going to make the project, and if they have already had some practice at shaping over the anvil, a much more rapid and more accurate method may be made use of as follows:

Secure a piece of ⅜ by 1½ by 32-in. stock. Make a full-size drawing of the leg as it is to appear when finished. Now proceed to shape the bar of iron as at *A* in Figure 1, to produce a form which has a curve at each end to correspond to the curve which the leg is to have after being bent over the form. To shape the lower end of the leg, center punch a mark 9½ in. from the end which is to be the bottom of the leg. Heat the iron at this mark, place the metal in the vise and form a right-angle bend. Now clamp the leg and the form together in the vise, as illustrated at *B* in Figure 1. Bend the leg down until it fits over the form at all points, as shown by the dotted lines. Make the same bend in all three legs, and compare them to see that they are alike.

To shape the feet, clamp the heated iron in the vise so that 1 in. projects above the vise jaws, hammer the foot until it forms a square corner; place the metal on the anvil and hammer until the foot has been shaped as desired. A little grinding may be necessary.

To curve the upper end of the legs, clamp the leg and the form together in the vise, as at *C*, Figure 1. Bring the

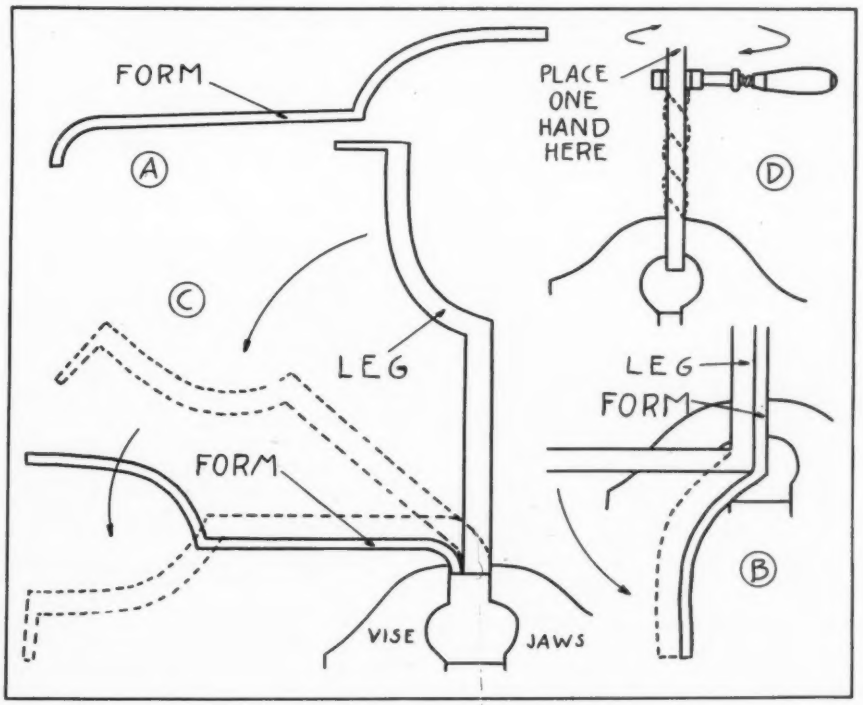


FIG. 1. HOW THE TABORET LEGS ARE BENT

leg down until it fits over the form at all points. Observe that the leg must pass at one side of the end of the form. Compare all three legs again, to make sure that they are alike.

The next step is to drill the two 3/16-in. holes in each leg, for fastening the leg to the ring. According to the illustration, Figure 2, the hole near the bottom is 2⅜ in. from the right-angle bend; the upper hole measures 2⅞ in. from the top of the leg. Mark one leg off, then lay this leg over the other two, and transfer the marks so that all three will be laid off exactly alike. It is very necessary to have the holes line up exactly, or the legs will not stand straight.

To make the twist in the vertical part of the leg, measure 1 in. in from each hole, to serve as the beginning and end of the twist. Clamp the leg in the vise at one of the marks, place the monkey wrench at the other mark, and twist the metal around through one whole revolution, see *D* in Figure 1. If one hand is placed above the monkey wrench, it can be made to guide the metal and prevent it from bending out of straight. See that all three legs are alike.

The legs may now be riveted to the rings with 3/16 by ¾ in. round-head rivets.

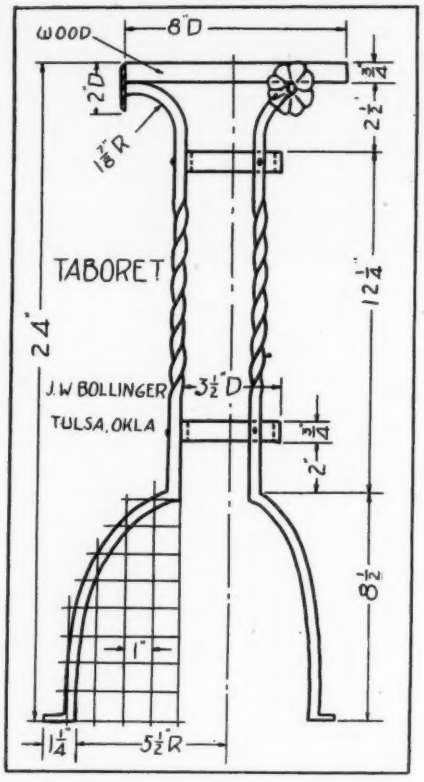


FIG. 2

The top of the taboret is made of light wood, the woodworking department. Place the top in position, and see whether it rests level, and whether the legs fit properly. Drill a 3/16-in. hole about 1 in. back from the end of each leg so that the top may be fastened to the legs by means of 1¼-in. round-head wood screws.

The rosettes which are to be fastened to the ends of the legs are made of No. 24 galvanized iron. The pieces are first cut 2 in. in diameter. These are then divided into eight segments, and the ends scalloped to represent petals. To increase the resemblance, the lines between the petals are slightly dented with a blunt-edged cold chisel. Drill into the ends of the legs with a 3/16-in. drill, and thread the holes with a No. 12-24 tap. Fasten the rosettes in place with 12-24 by ½-in. machine screws.

The entire project may be finished with 2 coats of enamel. Deep green and Prussian blue make a pleasing combination. If desired, the entire taboret may be spotted with gold bronzing powder, before the final coat of paint sets. To apply the bronzing powder, place a very small amount of it in a small V-shaped paper trough. Then blow lightly upon the powder, and it will cling to the newly painted surface.

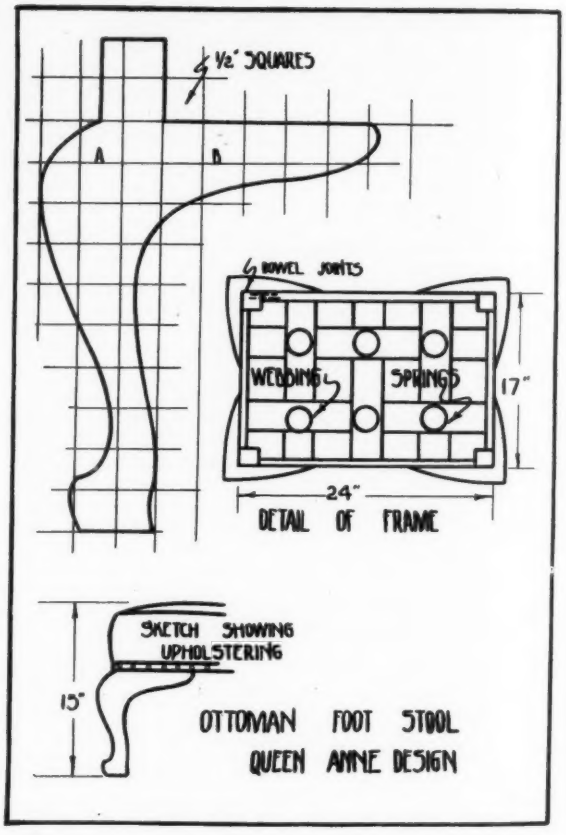
OTTOMAN FOOTSTOOL

C. T. Allen, Sandwich, Ill.

An old footstool was the inspiration for the Ottoman described in this article. The stool has been so designed as to make a favorite easy chair more comfortable.

It is higher than the ordinary footstool, thereby aiding to make the easy-chair more like a lounge.

Perhaps the most suitable wood for its construction would be walnut or mahogany.



Part A or the main leg is made from material 3¼ in. square by 12 in. long, and it is worked like any Queen Anne design leg.

Part B is made separately and glued to part A after all band sawing has been done. It is a good idea to use a dowel joint between A and B.

The rails need not be made of the same wood as the legs, because they are covered up by the upholstering. Oak or birch make good strong rails.

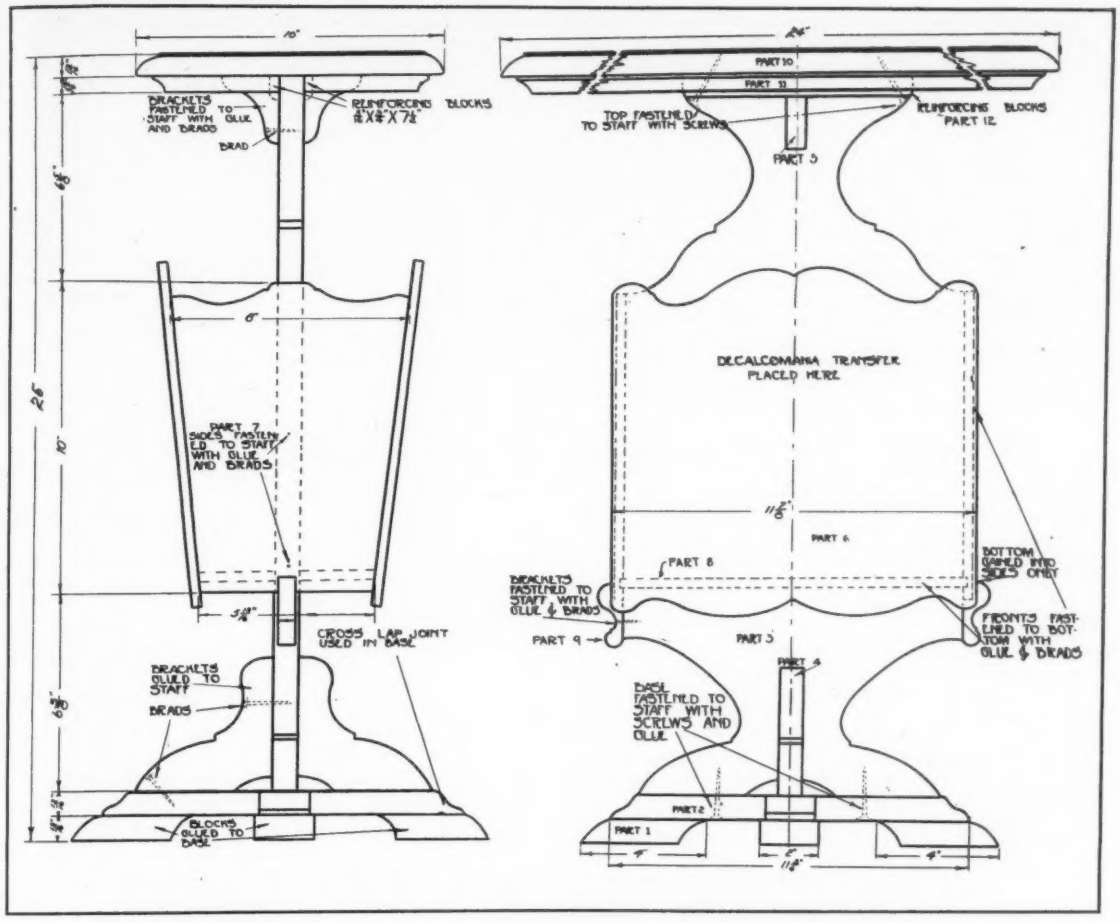
The webbing and springs may be put in according to the illustration, although nine springs make up better than six.

The upholstering cover should be tapestry. Mill ends of tapestry can be frequently secured at furniture stores for a very small cost.

COMBINATION MAGAZINE RACK AND END TABLE

Leslie W. Browne, Delavan, Wis.

The combination magazine rack and end table shown herewith was designed as a ninth-grade project. It may, however, be used also as a project in the senior-high-school woodworking class.


BRACKETS FASTENED TO STAFF WITH GLUE AND BRADS
BRAD
REINFORCING BLOCKS
PART 7 SIDES FASTENED TO STAFF WITH GLUE AND BRADS
CROSS LAP JOINT USED IN BASE
BRACKETS GLUED TO STAFF
BRADS
BLOCKS GLUED TO BASE
PART 10
PART 11
TOP FASTENED TO STAFF WITH SCREWS
REINFORCING BLOCKS PART 12
PART 5
DECALCOMANIA TRANSFER PLACED HERE
PART 6
PART 8
BOTTOM GAINED INTO SIDES ONLY
BRACKETS FASTENED TO STAFF WITH GLUE & BRADS
PART 9
PART 3
FRONTS FASTENED TO BOTTOM WITH GLUE & BRADS
PART 4
BACK FASTENED TO STAFF WITH SCREWS AND GLUE
PART 2
PART 1

COMBINATION MAGAZINE RACK AND END TABLE, DESIGNED BY LESLIE W. BROWNE, DELAVAN, WIS.

The project contains a number of tool operations, which the average student can master without too much difficulty. The kind of material to be used, is optional.

While the drawing is self-explanatory, it may be modified to suit individual taste in design.

Bill of Material

Part No.	*No. of Pieces*	*Size*	*Name of Part*
1	4	13/16 x 2 x 4	Base Blocks
2	2	13/16 x 2 x 4	Base
3	1	⅞ x 11 x 24	Staff
4	2	13/16 x 4½ x 4½	Bottom Brackets
5	2	⅝ x 1¾ x 2½	Top Brackets
6	2	5/16 x 12 x 11½	Front of Rack
7	2	5/16 x 8 x 10	Sides
8	2	5/16 x 2½ x 11½	Bottom
9	2	⅝ x ⅞ x 2⅛	Brackets
10	1	⅞ x 10 x 24	Top
11	6 lineal feet		Cove
12	1	⅜ x ¾ x 5¼	Reinforcing Blocks

VACUUM GAUGE

August Flam, Los Angeles, Calif.

(See Supplements Nos. 135 and 136)

A very serviceable vacuum gauge can be constructed at slight cost from materials available in practically all high-school shops.

Referring to the free-hand assembly sketch (Supplement No. 135), the base is a wooden disc, containing three upright studs, which act as supports for the mercury container. These studs are threaded at their top ends, and screw into the bottom plate of the mercury container.

The mercury container is a glass cylinder, similar to those used on large oil cups, and is secured by two plates of steel. Suitable washers of rubber are provided as shown, and the glass is tightly clamped between the top and bottom plates by means of six small rods, threaded at both ends.

The fiber ring fastened into the bottom of the mercury cup, is used merely as a filler, to take up space which otherwise would have to be filled with mercury. The large screw at the bottom is an adjustment screw, for adjusting the mercury level.

The top plate is provided with a removable plug, and through the hole, mercury can be poured into the cup or drained from it. Another small screw, permanently fastened by riveting over, is provided in the top plate for the level indicator. This indicator should have its conical end painted some distinctive color—preferably red. Before connecting the vacuum gauge to the apparatus to be tested, the adjusting screw should be turned to lower or raise the mercury level until the top surface of the mercury just touches this conical point. This level is at the zero point.

Into the top plate is secured an ordinary ½-in. wrought-iron pipe, slotted and grooved, to permit a thin brass scale to be fastened upon it on one side, and admit light from the opposite side, so that the level of the mercury may be readily detected and read on the scale. Within this pipe is a glass rod, reaching well into the mercury as shown, and projecting out far enough to take a rubber hose and suitable connection, through controlling valve, to apparatus to be tested.

The glass rod is secured in the pipe by means of rubber packing, and sealed with plaster paris. At the top end of the pipe, a cap is provided with two small holes. A wire

may be looped through these holes, and the apparatus may be easily transported by means of this handle.

The free-hand assembly drawing is adapted for use in the mechanical-drawing class. The problem of detailing from it, is identical with the type of work actually found in drafting rooms. All the information needed for the detailing is given. The student may be required to detail the vacuum gauge completely, and after detailing, make an assembly drawing of several views and sections from his own details.

The completed detail drawing herewith given has a two-fold purpose: it may be used in the machine shop to construct a vacuum gauge; it may also be used as a model of detailing in the mechanical-drawing class. The assembly is the problem, and the completed details the solution thereof.

A satisfactory project may be worked out, if the student who draws the details from the assembly sketch in the mechanical-drawing class is permitted to construct the vacuum gauge from his own detail drawings in the shop.

The value of such an exercise is incalculable.

A SHEET-METAL SAILBOAT

A. F. Ryan, Junior High School No 4, Trenton, N. J.

Metal sailboats are usually stamped, but that means machinery. Here is a 24-in. sheet-metal hull that can be made in the home or school shop with but few tools.

The total cost should not exceed 80 cents and the finished boat will surpass one made of wood because it will be lighter, stronger, and more water-tight. It is, in fact, nonsinkable.

The general idea of the boat hull can be seen from the illustrations. This boat is made as follows:

Take a sheet of double-coated tin; there are several trade names and numbers for this sheet, but really it is a piece of steel, tin plated on both sides, and is about No. 28 gauge. Size of piece 24 by 10 in. Scribe a line down the center of the sheet and mark off 24 parallel lines, 1 in. apart. Upon these, lay off the dimensions shown on the layout plan. Take a flexible stick (a yardstick will do) and bend it to meet the points which have been laid out, and have someone else draw the line connecting the points. Cut out the blank, being careful to cut to the line. The best plan is to rest the shears on the bench while doing this.

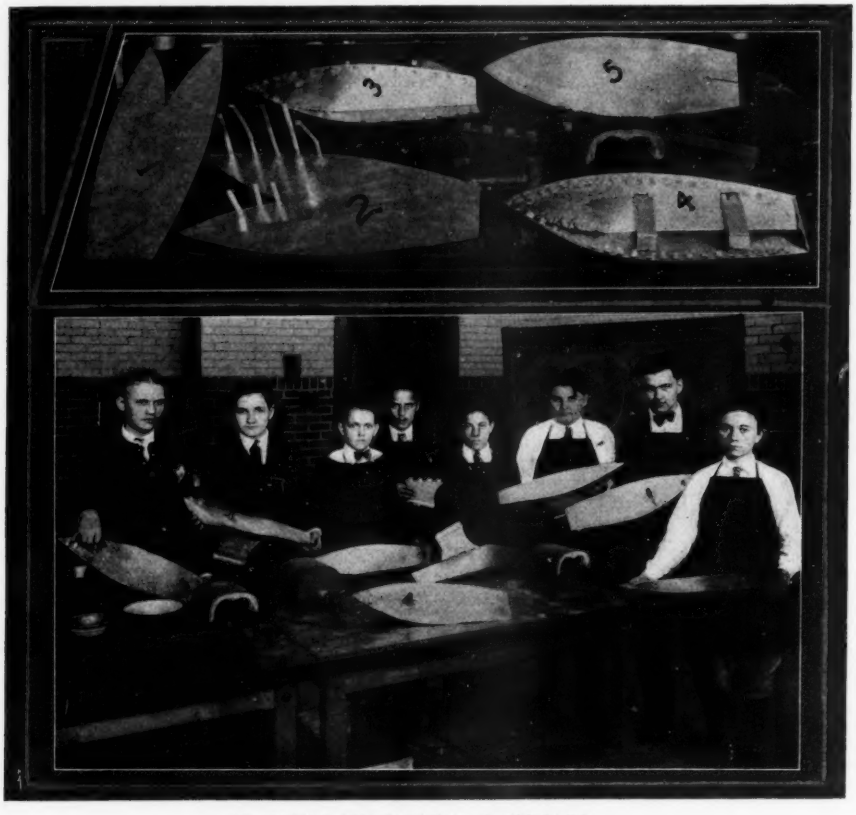
With the dividers, scribe the three lines shown on the cutting and bending plan. Place the pattern or sheet on the edge of the bench and bend to shape with your hand, being careful to keep the center line on the bench edge. Now place and solder the angles as shown. These angles are made of scrap tin ⅜ in. wide. After they are placed, cut them all to a height of ¼ in.

The hull is now ready to have the bow ends pulled together so that the one side can be soldered to the angle pieces. To check up your work, see if your boat measures 7 in. across about where the mast will come. After the bow angles are soldered, the two sides should be soldered along the inside of the bowline. Take care so that the solder on the angles is not melted off.

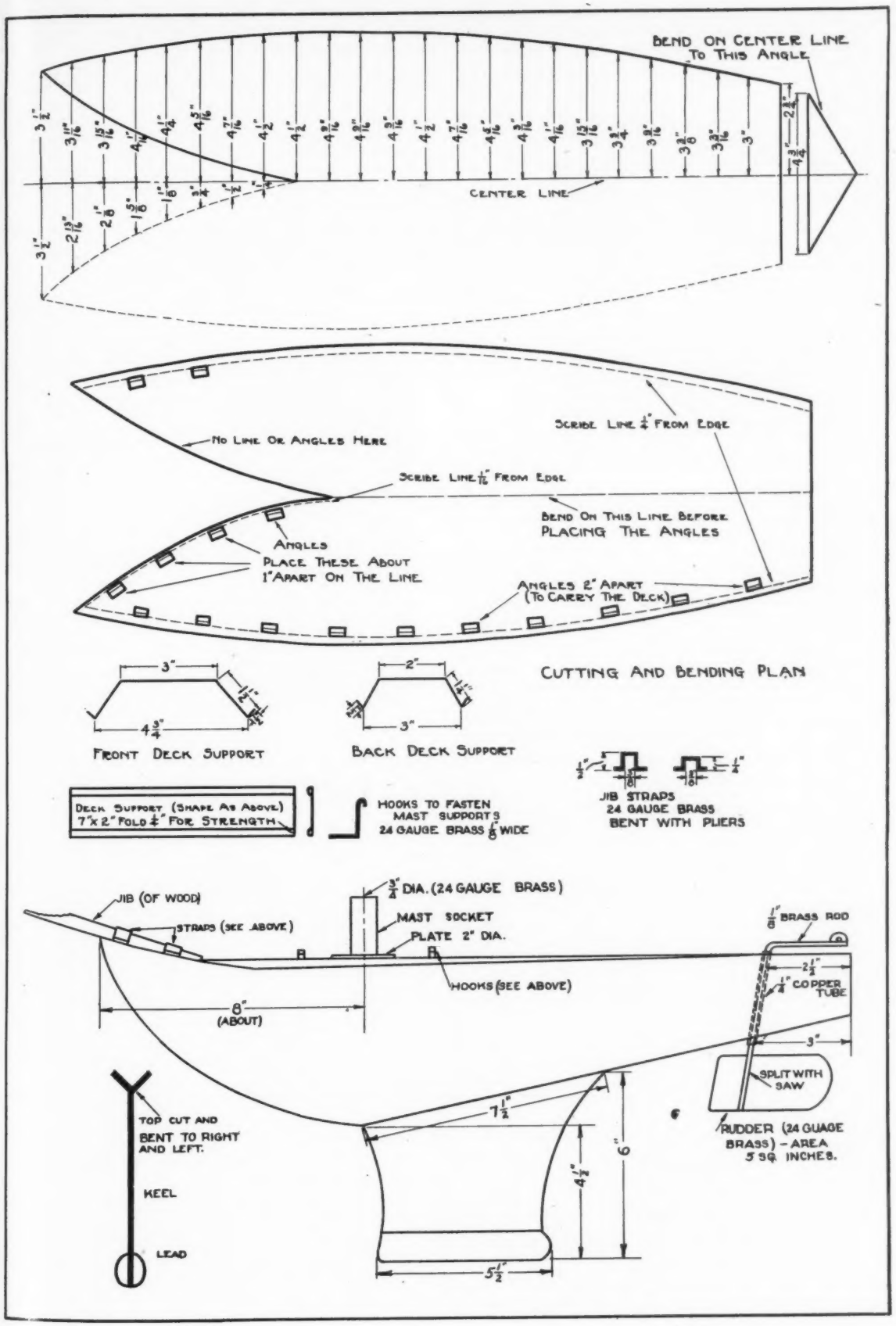
Next take 2 pieces of tin, one 7 by 2 in. and one 5½ by 2 in, put ¼-in. folds on each side. These pieces should then be bent as shown. They are used to brace the deck, the large one goes beneath the mast, and the other 5 in. from the stern of the boat. Solder each in place, being careful to see that their tops are in line with a rule or straight edge resting on the sides of the boat.

Make a back piece for the boat by standing it on its stern and tracing its shape on a piece of tin. Add a ¼ in. all around to this shape and bend this ¼-in. fold in the vise so that the piece will look like the top of a cocoa can. Solder the end piece to the hull.

To make the deck, turn the boat upside down on a sheet of tin 24 in. by 8 in. Place a book or block of wood under the widest part, to take the strain from bow and stern ends. Then press down firmly but not hard enough to make the boat bulge, and with a sharp scriber trace its shape on the piece of tin. Mark it so you can put it in place again, and then cut out the shape very carefully. Try it on the boat and see that it fits inside the sides, and even with the top edges when it rests on the angles. If the deck is too large, set the divider for 1/16 in. and scribe around the sides. Cut off this little strip, and try again. If the deck is O.K.,



BUILDING SHEET-METAL SAILBOATS


BEND ON CENTER LINE TO THIS ANGLE
CENTER LINE
SCRIBE LINE ¼" FROM EDGE
NO LINE OR ANGLES HERE
SCRIBE LINE 1/16" FROM EDGE
BEND ON THIS LINE BEFORE PLACING THE ANGLES
ANGLES
PLACE THESE ABOUT 1" APART ON THE LINE
ANGLES 2" APART (TO CARRY THE DECK)
CUTTING AND BENDING PLAN
FRONT DECK SUPPORT
BACK DECK SUPPORT
DECK SUPPORT (SHAPE AS ABOVE) 7"x 2" FOLD ¼" FOR STRENGTH
HOOKS TO FASTEN MAST SUPPORTS 24 GAUGE BRASS ⅛" WIDE
JIB STRAPS 24 GAUGE BRASS BENT WITH PLIERS
JIB (OF WOOD)
STRAPS (SEE ABOVE)
¾" DIA. (24 GAUGE BRASS)
MAST SOCKET
PLATE 2" DIA.
HOOKS (SEE ABOVE)
8" (ABOUT)
1/8" BRASS ROD
2½"
¼" COPPER TUBE
3"
SPLIT WITH SAW
RUDDER (24 GUAGE BRASS) – AREA 5 SQ. INCHES.
TOP CUT AND BENT TO RIGHT AND LEFT.
KEEL
LEAD
7½"
6"
4½"
5½"

"spot" solder it every 2 in., working one side at a time from front to back and pressing down as you work along. Cut the stern end off last. Then carefully solder down the deck all around.

The hull is now done and can be tested. Make the jib straps and place the first one, ¾ in. from the point, and the second one, 2 in. Then place and fasten the mast socket and guy hooks. The hooks are fastened on the edges of the hull, 2 in. ahead and back of the mast.

Place the rudder tube or pipe as shown, soldering both ends. Make rudder post and rudder.

The keel is made of No. 20 gauge sheet brass or galvanized iron. Bore about 4 holes, ½ in. in diameter, ½ in. from the bottom edge of this keel and make a mold of wood with a gouge. Pour about 1½ lb. of lead around this keel. File smooth, fill any voids with solder, and place as shown.

No details of the sails are given, as there are many good books on sail design alone. We use a 22-in. mast and a leg of mutton sail with a jib sail. In all, we place about 260 sq. in. of sail on this boat.

SPARROW TRAP

W. E. Cunningham, Elm Place School, Highland Park, Ill.

Now that spring is here, and our feathered friends have returned from the South to build their nests in the houses we have put up for them, we feel the need of a trap to get rid of a few of the sparrows that try to preempt the homes of our feathered friends.

The material used is ½-in. white pine with the exception of part D which is made of ⅜-in. plywood and part E which is made of stiff cardboard, about 1/16-in. thick.

In building this trap it is well to begin with parts D and E and get the location of the pivot points. The trapdoor should be so balanced, that it takes almost the weight of a sparrow to get it over the balance, otherwise it remains in the position shown in Figure 2. Even then it is necessary to have part A just the right width to prevent the trapdoor from remaining down. Part B is used instead of extending D across so that a greater opening may be had through which the sparrow may fall into the compartment below. Part C prevents escape behind the door and serves as a rest for the door when it is in its normal position. Part E shuts off the sight of the entrance, while the light which comes through the windows, urges the sparrow to enter the chamber below. It is necessary that part E be made of cardboard in order to obtain a good balance.

After the pivot-point has been found on part D, a 4d finishing nail should be driven in. Then by careful measuring, the places where the nails should come through the sides can be found. A 1/16-in. hole should be drilled through each side to allow the nails to turn freely. It is advisable to put a copper burr over the nails on each side between the trapdoor and the sides of the trap to prevent the cardboard from rubbing the sides of the trap, and thus keeping the trap from resetting itself.

LINCRUSTA ON CABINETMAKING PROJECTS

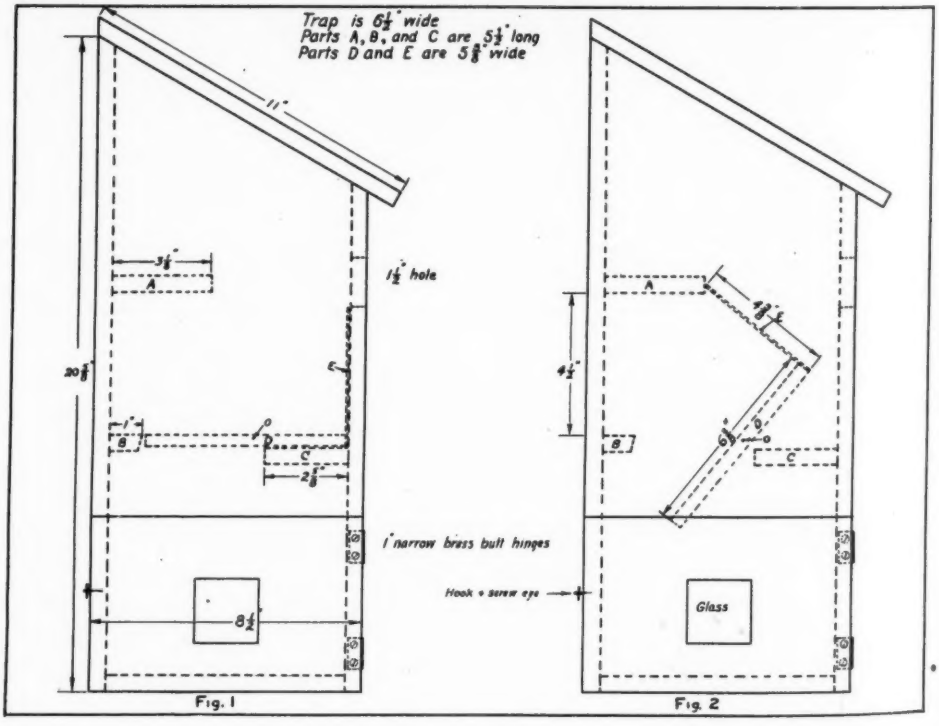
G. Harold Billingham, Supervisor of Mechanic Arts, Weehawken, N. J.

The problem of turning out projects that are not "labeled" schoolwork by those who see them, confronts every shop teacher.

LINCRUSTA ON CABINETMAKING PROJECTS

We have had considerable success in producing exceptionally fine radio cabinets, smoking cabinets, end tables, cedar chests, and similar products using lincrusta wall covering to imitate carving. The results have been very pleasing, and the rapidity with which they can be obtained is an added advantage in a school system where a limited amount of time is allotted for shopwork.

A canvas of the local wall-paper merchants, netted us several sample books of lincrusta. These samples were of ample size for use, and of a variety of motifs, but they were not all the same shade or color.



THE SPARROW TRAP

Designed by W. E. Cunningham, Elm Place School, Highland Park, Ill.

With a paper trimmer, and a pair of scissors, the patterns were cut to conform to the section they were to fill. Piecing was also found necessary when the samples were not long enough to fill the allotted space.

The patterns were fastened to the article in the white with hot glue.

After the glue was thoroughly dry, a coating of dark oak stain was applied, and later color varnish to tone the lighter lincrusta to the proper shade. The woodwork was then finished in the usual manner.

The boys took a great deal of interest in these projects and have furnished many additional ideas as to where lincrusta could be used successfully.

A MODEL CATBOAT

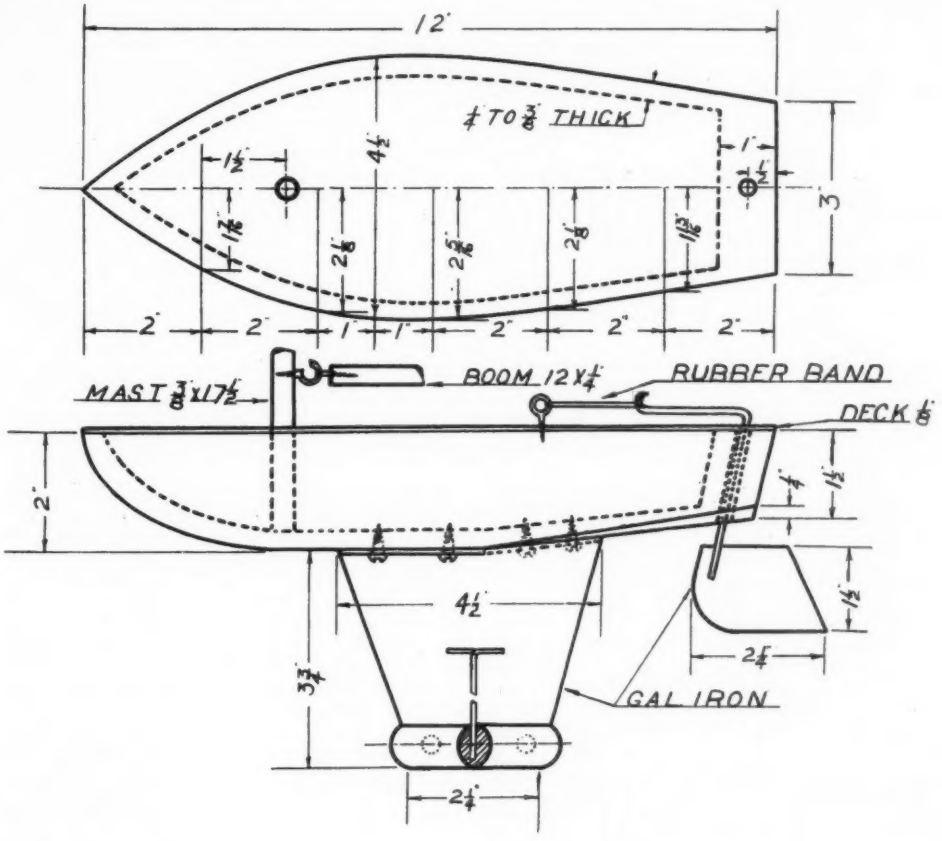
H. G. Stintsman, Bridgeton High School, Bridgeton, New Jersey

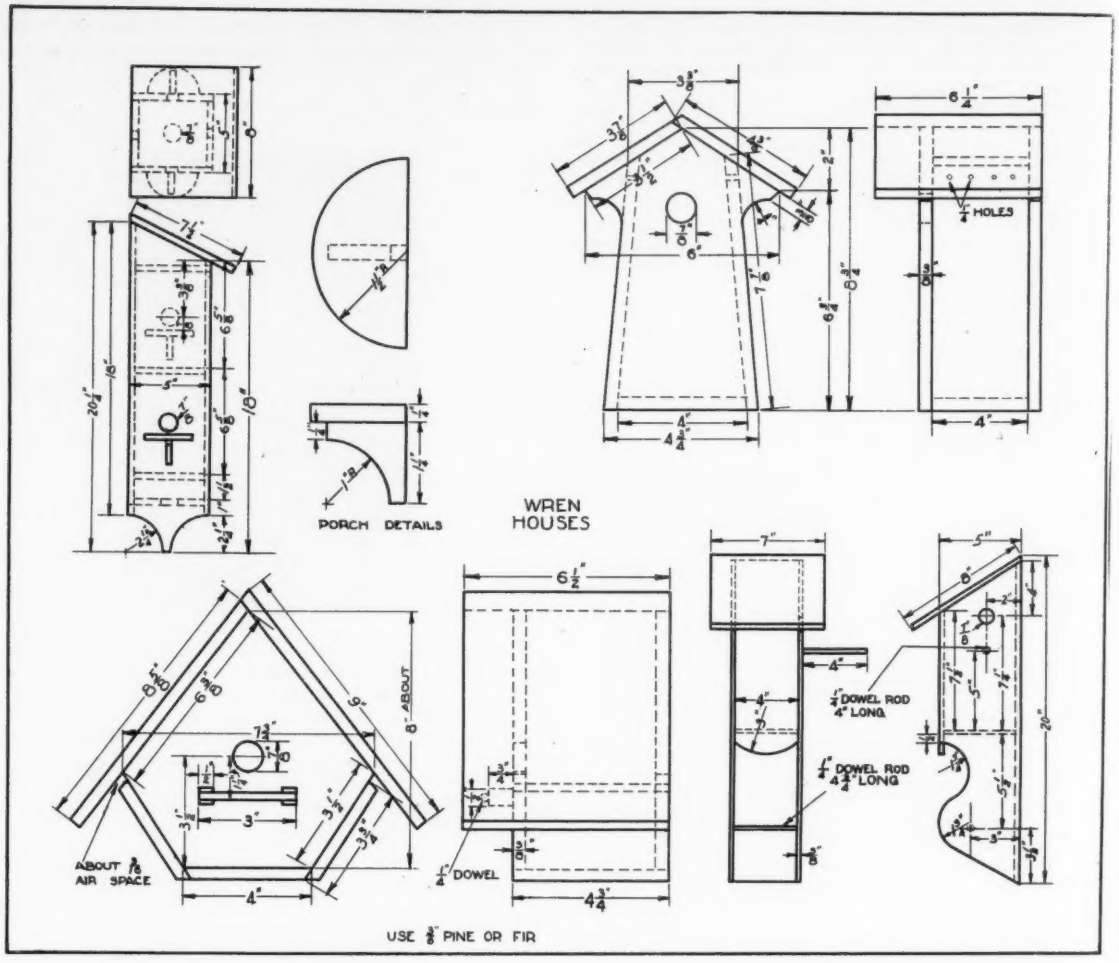
Model boats have become favorite projects for enterprising shop teachers.

This model catboat has become quite a favorite with the sixth and seventh-grade boys. It gives a variety of experiences with the different materials. The following procedure may be followed:

1. Cut the blocks to the deck plan on the band saw, from soft white pine.
2. Nail the block to the deck side, place it in the vise, and shape the outside of the hull.
3. Hollow out the inside of the hull by boring and gouging.
4. Paint the inside of the hull with a coat of asphaltum.
5. Cut, drill, and bend the keel.
6. Cut the rudder and slit the rod with a hack saw, then solder.
7. Make the mold for the bottom of the keel and pour the lead.
8. Fasten the keel with small screws, and paint the boat with a prime coat.
9. Nail the deck on with small brads.
10. Bore a hole for the rudder post and mast.
11. Paint the boat again. (Two colors may be used.)
12. Make the mast and boom of soft white pine.
13. Insert the mast, rudder, and rig.

A string running through a small screw eye placed on the upper part of the mast to a screw eye on each side of the boat will hold the mast in position. The boom may be fastened to the rubber band for steering. The sail should be about 14 in. along the mast, and 11 in. along the boom. Curtain rings may be used on the mast. A string running through a screw eye at the top of the mast may be used to raise or lower the sail. This string can be fastened to a cleat on the deck.





WREN HOUSES, DESIGNED BY R. B. FARR, SOUTH JUNIOR HIGH SCHOOL, EVERETT, WASH.

THE MARCH MEETING OF THE BOSTON VOCATIONAL SOCIETY

The Vocational Education Society of Boston held its regular monthly meeting and luncheon on Saturday, March 16, at the Hotel Westminster, Boston. In keeping with the plan of having the speakers talk on industrial education from different standpoints, the topic for the meeting was limited to the viewpoint of the manufacturers.

Mr. Harold Cole, the speaker of the day, talked on the subject, "The Present-Day Selection in Industry and Vocational Training Within the Industry." Speaking on the work of the Dennison Manufacturing Company, with which Mr. Cole is connected, he described the method employed in the selection and employment of workers in the plant. Each person is first interviewed by a member of the personnel force in order to determine the status of the applicant. The interviewer tries to judge the seriousness, reliability, stability, and moral character of the job seeker. If the applicant passes all these requirements he is given aptitude tests similar to those used by Mr. Johnson O'Connor of the General Electric Company of Lynn.

For the clerical positions the tests are expected to measure first: Trade knowledge and skill; second, general intelligence. Written direction tests, vocabulary, and word association tests are given to file clerks and typists. For the mechanical jobs such as machine adjusters, the "wiggly" block test is used and the results of the test checked with a special relation test and the MacQuarrie mechanical-aptitude test.

The results of the tests is not the only factor that determines the question of hiring the individual, but the results of the tests are talked over with the employment manager and the probable success decided upon.

When a new employee is employed in the plant he is brought to the foreman, who in turn brings him to the instructor in charge of the work. In some departments, instructors are employed full time, but in others, the instructors only instruct a part of the time and are workers the rest of the day. The instructors are selected from among the employees and first of all must be above the average as workers, since speed is one of the important factors in the work. A careful record is kept of each employee, which is used as a reference in the selection of the instructor.

After the instructor is appointed, his first duty is to make out a job analysis of his job, and from the job analysis the lessons for the learner are made up. It is necessary for each instructor to make out his own job analysis, since it is found by experience that the previous analysis is rendered valueless in the hands of a new man.

Discussing the advantages of operating a training school for employees, Mr. Cole told the story of a foreman who claimed that he could train his own help cheaper and better than could be done under the present system. He was allowed to try out his plan, and after seven months admitted the results were unsatisfactory. It was found that the foreman had taken from six to nine months to bring new work-

ers up to the standard, when under the regular system, the same work could have been done in from six to nine weeks. In the regular plant scheme of training the work was carefully selected and accurate progress records were kept. Progress charts have been made from a detailed study of past performances so that the learner may at any time measure his own progress with that of other learners.

In addition to saving considerable time in the training of workers, it was pointed out that careful selection and training have minimized the need for supervision. Several instances were cited where inspectors' jobs had been eliminated and the responsibility for the right job had been placed directly on the worker. By careful selection of the employees, the labor turnover was reduced. In 1925 the labor turnover was 26 per cent, but in 1928 this had been reduced to eighteen per cent.

Mr. Cole emphasized in his talk that increased efficiency standards are required of labor in industry today. Greater speed and accuracy are expected of the workers than ever before. He cited the lack of responsibility of workers as the reason for the failure of workers to succeed in industry. Many workers have the ability to get ahead but refuse the responsibility that goes with the higher positions. Workers who cannot work without supervision cannot be trusted with certain positions. An example of increased efficiency in industry was cited in an experiment recently attempted in the Dennison plant. Motion pictures were used in comparing fast and slow operators at work, in order to determine what the slow ones lacked and the fast ones possessed.

In closing Mr. Cole described a new plan now being tried out, which invites the workers to buy and own shares in the company on a so-called compulsory saving arrangement. Under the plan, two thirds of the profits of the firm go to the managerial stockholders, and one third to the employee stockholders. Dividends are regularly invested so that an old employee who reaches the retirement age uses his dividends as a pension fund.—*Louis A. Van Ham.*

MEETING OF THE TULSA MANUAL ARTS CLUB

The March meeting of the Tulsa Manual Arts Club of Tulsa, Okla., was given over to the topic "Reorganization of Methods Demanded by Shop Classes of 36 Pupils."

Mr. G. B. Willett, of Grover Cleveland School, presented the case from the point of view of the woodshop. Mr. Willett has taught woodwork in the junior high school, with classes ranging in size from 30 to 40 pupils. He described his method of handling the classes as follows: First of all he makes up a group of perhaps five or six projects; these projects he presents to his classes as the ones which might be made during the term. Each pupil selects the one he wants to make; thereafter Mr. Willett groups pupils making the same projects together, usually in groups of eight. There would be then from four to five different groups in the class. These groups Mr. Willett treats as individuals, going about from group to group, and giving demonstrations, instruction, supplies, etc., to each group as though the group were an individual student. The members of the group work together, the abler pupils assisting the slower ones. The speaker maintained that he is able to get as good work from pupils in large classes, as he was previously able to get from pupils in classes of 24.

The case from the point of view of the metal shop was presented by Mr. J. W. Bollinger, of the Roosevelt School. The speaker stated that the movement to increase the size of shop classes above 24 pupils per class was a national movement, and that an increase was almost certain to come. He proceeded to outline a method of conducting such classes, by maintaining the individual instruction method now in use by means of the wholesale use of individual instruction sheets described by Prof. R. W. Selvidge. Mr. Bollinger organized a series of instruction sheets dealing with operations, another series dealing with related information, and a third dealing with jobs, by means of which the desired operations and information may be taught. He pointed out that there were a number of difficulties to be overcome, particularly in connection with the preparation and handling of the instruction sheets, but feared that, because of the shorter teacher time per pupil, the net result might be a decided lowering in pupil achievement, and a step in the direction of false economy.

The club was honored by the presence of the superintendent, Dr. P. P. Claxton, and by three of the principals of junior high schools in the city. One of these principals, Mr. Perry Carmicheal, told the club of some classes in shopwork he had visited in Cleveland, Ohio, during the meeting of the Department of Superintendence. The speaker stated that the work in these classes seemd to be going nicely, and that he saw no good reason why shop classes could not in time be made as large as 35 or 40 pupils each.

Following a lively discussion, the members of the club pledged themselves to make an earnest effort to conduct such classes, provided the necessary space, equipment, and instructional helps were furnished in each case. In his summary, Dr. Claxton said, that it was well known, that if a lobster is placed in cold water, and if the water is thereafter slowly heated, the lobster seems to experience no pain until the water becomes quite hot. Teachers everywhere have been having an analogous experience with reference to gradual increase in the size of classes. For shopmen, Dr. Claxton stated that there was a time when 18 or 20 pupils was considered a maximum; now the maximum has jumped to 24; the jump to 36 will not be made suddenly, but by degrees, over a period of several years, during which time teachers may develop their methods of instruction and perfect their technique so as to be able to handle larger groups as easily and as effectively as they are handling groups of 24 at present.

Out-of-town visitors present were: Mr. B. A. Weigl, superintendent of schools at Ramona; Mr. H. B. Bowman, also of Ramona; Mr. F. M. Dorsey, of Jenks; Mr. H. A. Allender, and Mr. G. W. Hollar, both of Bristow.—*J. W. Bollinger.*

TENTATIVE PROGRAM OF WESTERN ARTS ASSOCIATION

The chairman of the program committee of the Western Arts Association has announced the completion of the program for the next convention which will be held April 30 to May 3 at Cleveland, Ohio.

A fine program has been arranged, with a list of good speakers and a selection of timely subjects. The keynote of the convention will be the "Development of the Individual Through the Creative Arts." The list of topics and the speakers is as follows:

General Sessions

Tuesday, April 30

Address of Welcome, Mr. R. G. Jones, Superintendent of Schools, Cleveland, Ohio.

President's address, Miss Mary C. Scovel, Chicago Art Institute.

Objectives of the Creative Arts in Our Schools, Dr. George E. Meyers, University of Michigan, Ann Arbor.

Why an Art Education, Vesper George, Director of the Vesper George School of Art, Boston, Mass.

Wednesday, May 1

New Problems for Manual-Arts Teachers, Augustus F. Rose, Director of Manual Arts, Providence, R. I.

New Opportunity for Teaching Design and Construction in Shopwork, Mr. C. A. Bennett, Peoria, Ill.

What Every Teacher of the Creative Arts Should Know, Mr. Augustus F. Rose, Director of Manual Arts, Providence, R. I.

Radiant Energy and Vitamins—A Basis for Creative Arts and Life, Mr. Weston A. Price, Cleveland, Ohio.

Thursday, May 2

Measuring Men, Dr. Johnson O'Connor, Lynn, Mass.

The Essential Factor, Charles F. Kelly, Director of the Art Institute, Chicago, Ill.

Friday, May 3

What Europe Is Doing in Graphic and Industrial Arts Today, Mr. Henry Turner Bailey, Director of the Cleveland School of Art.

Sectional Meetings

Art Round Table, Miss Belle C. Scofield, Indianapolis, Chairman.

Selling Art Education to the Community, Mr. James Boudreau, Director of School of Fine and Applied Arts, Brooklyn, N. Y.

Specific Values to be Obtained from Some Definite Projects Properly Motivated, Miss Harriet Estelle Hayden, Director of Art in the Public Schools, Des Moines, Iowa.

Merchandizing Color, Miss Henrietta Murdock, Upson Paper Co., Lockport, N. Y.

Home-Economics Round Table, Miss Charlotte M. Ullrich, Cincinnati, Ohio, Chairman.

Art Principles Applied to Everyday Life, Miss Lucy Ward, East Technical High School, Cleveland, Ohio.

Art of Attractive Personal Appearance, Miss Ethelyn Bohenmeyer, Longwood Commercial High School.

Manual Training Round Table, Mr. Roy R. VanDuzee, West Allis, Wis., Chairman.

Cooperative Plan of Industrial Education, Mr. H. W. Paine, Toledo University.

Shall Aeronautics be Introduced as a Part of a High-School Industrial-Arts Program? Mr. S. H. Hurtuk, Waite High School, Toledo, Ohio.

Printing Round Table, Mr. Charles B. Murphy, South Bend, Ind., Chairman.

Printing—Its Relationship to English and Design, Mr. E. E. Sheldon, Lakeside Press, Chicago, Ill.

Applied Design for Printers, Mr. Homer E. Sterling, Carnegie Institute of Technology, Pittsburgh, Pa.

Printing, A Fine Art, Mr. Horace Carr, Cleveland, Ohio.

Vocational Education, Mr. Ray F. Kuns, Cincinnati, Ohio, Chairman.

Is the Machine Displacing the Worker? Harry E. Blythe, Goodyear Tire and Rubber Co., Akron, Ohio.

Keeping the Related Subjects Related, Mr. R. W. Selvidge, University of Missouri, Columbia, Mo.

The Measurement of Executives, Dr. Johnson O'Connor, Lynn, Mass.

Manual Training and Vocational Education, Mr. Roy R. VanDuzee and Mr. Ray Kuns, Chairmen.

Do Exploratory Courses Actually Function as Guidance Factors? Mr. W. H. Stone, Director of Guidance, West Allis, Wis.

Mechanical Drawing, Mr. A. B. Babbett, Cuyahoga Falls, Ohio.

Arrangement of Instruction Material, Mr. R. W. Selvidge, University of Missouri, Columbia, Mo.

Art and Home Economics, Miss Belle Scofield and Miss Charlotte Ullrich, Chairmen.

Some Points in the History of Costumes, Applicable to the Present Day, Miss Victoria Kloss, Hiram College, Hiram, Ohio.

Appreciation, Mrs. Florence W. Nicholas, Richmond, Ind.

Dr. Johnson O'Connor, who has gained considerable prominence through his work in testing men for executive and mechanical positions in the West Lynn Works of the General Electric Company of West Lynn, Mass., will speak before the vocational section of the Western Arts Association convention. Dr. O'Connor is an able speaker and is prepared to present some interesting material concerning his method of measurement. In connection with his talk, Dr. O'Connor will call for volunteers from his audience on whom his tests may be tried out.

Dr. O'Connor is the author of an interesting book "Born That Way" which was recently published by the Williams & Watkins Company of Baltimore, Md.

THE CHICAGO DISTRICT—INDUSTRIAL-ARTS ROUND TABLE

The March meeting of the industrial-arts round table of the Chicago district was held on Friday, March 22, at the Joliet Township High School, Joliet, Ill., with 94 members in attendance. In all, about fifteen school systems were represented by from one to ten members each. Joliet as host, was represented by twenty members.

Dinner was served at the Chamber of Commerce Building. Mr. Drew W. Castle, the vocational director of the Joliet High School, had given careful attention to all details, so that every event went smoothly. After the dinner, Mr. Castle introduced Mr. W. W. Haggard, the new superintendent of Joliet Township High School. He spoke a brief word of welcome to the visiting members and complimented the organization on the enthusiasm and professional interest of its members.

Due to the fact that the May meeting of the round table will be at Waukegan, representatives of the schools there distributed three-ply wooden tags at the dinner table, announcing the May meeting in a most enticing manner. They promised "a most unique gathering."

After distributing folders showing the floor plans of the buildings and explaining where certain other activities might be found, Mr. Castle dismissed the group to find its way to the high-school building. There, all the shops were in operation and the members visited as they desired. Interest seemed to be divided equally among the many well-equipped and thoroughly organized shops of this fine school.

A 150-page booklet describing the vocational program of the school was given to each of the visitors, and also a brief one on personnel service to those who were interested. Unique blotters had been printed in the printshop as a memento of the club's visit. At the bottom of the blotter had been printed the names of the visitors, one on each blotter with the caption—"(John Roe) was there," as an example. These names had been taken from the sheets passed about at the table on which each one had signed his name, address and school, as is the custom of the club for the sake of keeping records of attendance.

The automotive department presented its guests with a folder containing a table by which the total cost of varying amounts of gasoline at various prices can be quickly computed. These suggestions as to types of mementos may be of value to other shop departments wishing some inexpensive form of gift.

The April meeting of the round table will be held in the loop district of Chicago about April 26.—*William C. Brubaker.*

THE INDUSTRIAL-ARTS CONFERENCE AT CARNEGIE INSTITUTE OF TECHNOLOGY

An industrial-arts and vocational conference was held March 22 and 23, at the Carnegie Institute of Technology, Pittsburgh, Pa., with Mr. G. U. Cleeton of the department of industrial education of the Institute, presiding.

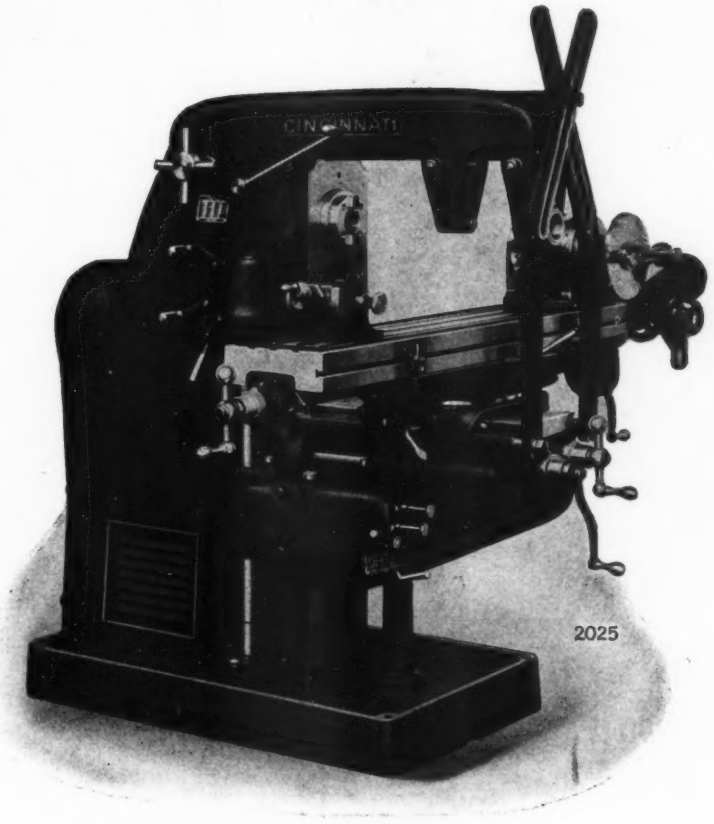
Mr. M. M. Proffitt, specialist in the industrial-education department of the U. S. Bureau of Education, addressed the groups, speaking on "The Objectives of Industrial Arts." Mr. Proffitt in his talk, linked up these objectives with the seven cardinal principles of education, and emphasized that the time has come when school authorities must justify the courses offered, by showing good reasons for using the taxpayers' money for this purpose. He pointed out that the state of Maine is establishing industrial-arts courses on the basis of home mechanics and in other sections the general shop is supplanting the manual-arts course.

Again, Mr. Proffitt stressed the machine age and suggested that the present growing need for toolmakers shows that there is a greater demand now for toolmakers and machine builders than for any other kind of mechanic. He commented on the informational type of course now being introduced in some cities to replace industrial-arts courses, but pointed out that while cheaper, it does not take the place of shop practice.

On Saturday, Mr. Proffitt spoke on "Some Tendencies in the Industrial-Arts Program." He mentioned that there is a tendency for schools to organize courses for vocational work, wherever there is a demand for these, regardless of the nature of the subject. Many industrial concerns have ceased operating extensive training plans, and the training is now being carried out in the public schools. Teaching techniques are undergoing modifications at the present time in order to accommodate additional pupils in a given period of time. Schools are providing better housing facilities for technical work and girls are entering some vocational courses which were formerly taken by boys.

Mention was made that character training is as necessary as vocational training for the pupils. The schools are making

(Continued on Page 34a)



Cincinnati M-Type Millers for Your School Shop

Cincinnati Millers, particularly the M-Type have been standard in *progressive* schools and colleges. The wide installation of this Miller in the school shops has proven it to be a milling machine most adaptable for instructional purposes and one that will meet with the requirements of your school shop. It is accepted as a standard and generally used in industry; its installation will furnish your students with the type of Milling machine he is most likely to operate in the industrial plant. This Miller is a highly developed machine with all the latest features in design incorporated.

Consider the advantageous *features* of this Miller; safety, accessibility, and ease of control and operation. In addition you know that accuracy is one of the prime factors in toolroom work and the rapidly developing aviation industry. Therefore it is essential; and combined with durability makes this Cincinnati Miller the most economical and best Miller for your school shops. You'll want the best there is. Our illustrated booklet "Facts on Features" will give you the story.

THE CINCINNATI MILLING MACHINE COMPANY
CINCINNATI, OHIO, U. S. A.

CINCINNATI MILLERS

Points on Drill Grinding

Putting a proper point on the business end of a twist drill doesn't sound hard—but the fact is that 11 pages, or practically 25% of the "Handbook for Drillers," are devoted exclusively to this all-important thing. In reality pointing a twist drill is a delicate piece of work calling for great skill, and much advance knowledge.

If you would like copies of the Handbook for the use of students in machine shop practice, we shall be glad to send them to you, without charge, in any reasonable quantities.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK-CHICAGO-LONDON SAN FRANCISCO
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

(Continued from Page 206)

an honest effort to differentiate vocational and industrial-arts courses, and considerable emphasis was placed on the outstanding problems of supervision and training of teachers.—*George C. Donson.*

INDUSTRIAL SECTION OF SOUTHERN PENNSYLVANIA EDUCATION ASSOCIATION HOLDS MEETING

The industrial section of the Southern Pennsylvania Education Association held a meeting in connection with the main association during the week of March 22, at Carlisle. The meeting was held in the high school and was in charge of Mr. W. A. Willoughby.

The general topic for the meeting was "How to Obtain a Higher Grade of Work from Pupils in the Machine Shop, Printshop, General Shop, Electrical Shop, and Woodworking Shop."

The group later attended the Southern Arts Association luncheon at the Molly Pitcher Hotel, where they listened to an interesting talk given by Mr. C. R. Foster of the Indiana Teachers' College.—*G. B. Westerberg.*

LEHIGH VALLEY ARTS ASSOCIATION HOLDS MEETING

The Lehigh Valley Arts Association of Pennsylvania held its annual meeting on March 23, at Bethlehem. The forenoon was devoted to round-table discussions for teachers and supervisors of art, commercial education, continuation schools, home-economics education, and industrial education. After the luncheon, a business meeting was held. Supt. W. H. Weiss of Bethlehem, and Dr. John A. Keith, state superintendent, were the speakers.

THE SOUTHERN WEST VIRGINIA INDUSTRIAL-ARTS ASSOCIATION

The Southern West Virginia Industrial-Arts Association held its annual meeting on March 16, at Charleston, W. Va.

At the meeting, Mr. S. P. Puffer talked on "Industries of the Kanawha Valley and Their Relation to Industrial Arts"; Mr. E. H. Shelton discussed "The Teacher"; Mr. G. A. Todd talked on "Shop Organization"; Mr. D. F. Pullen discussed "Problems of Instruction"; Mr. K. S. Fletcher took for his subject, "Industrial-Arts Values"; Mr. J. F. Barger talked on "The Relation of Industrial Arts to Academic Subjects," and Mr. R. H. Richards discussed "General Drawing as a Prerequisite for High-School Mechanical Drawing."

The meeting attracted a large attendance of members of the association.

MODERN MACHINERY AND THE FUTURE OF VOCATIONAL EDUCATION

The present age is a semiautomatic machine age. We shall soon see a large extension of full automatic machinery, that will create a new problem about which we as yet know nothing, just as the greater use of machinery has already created a farm problem. The testimony of events proves that many industries are passing through a radical change from traditional craft production to the status of a large-scale producing industry in which scientific organization, control, and technology will dominate.

Mr. Robert J. Wheeler, a member of the board of education at Allentown, Pa., takes the position that modern machinery, scientific management, and vocational schools of every sort are working to dispense with human labor in the conduct of American industry. Speaking on the subject before the Pennsylvania State Directors' Association at Harrisburg, Pa., on February 7, Mr. Wheeler spoke in part as follows:

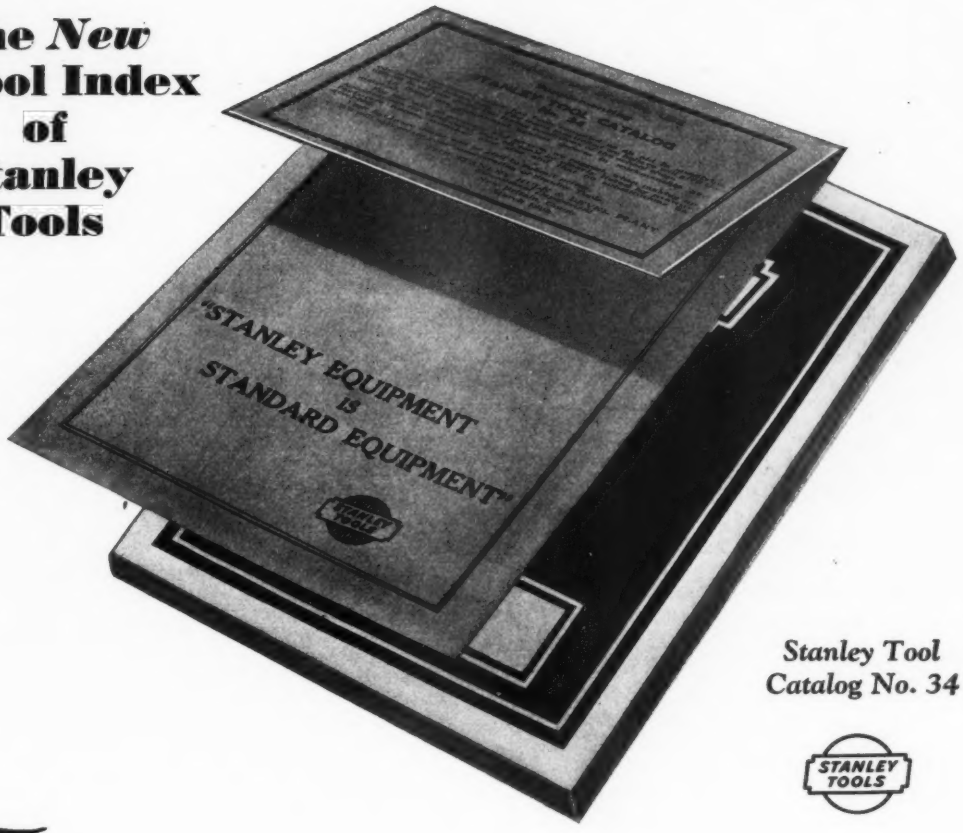
Vocational education, insofar as the teaching of trades is concerned, is of but little value to industry or society, because industry has discovered a better and cheaper method of production than by handcraft. Our conception of vocational education must change. Just as manufacture in all lines is evolving into industry, so vocational education must merge into the broader conception of industrial education.

Industrial education is not concerned with the teaching of trades, because industry is not interested in trades. Rather industry is looking for servitors who have the industrial

(Continued on Page 36a)

A Useful Guide for School Shop Equipment

The *New* School Index of Stanley Tools



Stanley Tool Catalog No. 34

STANLEY TOOLS

THIS condensed index has been compiled to help the instructor in the selection of tools for the school shop. Based on our experience and our study of tools, we recommend the items listed to meet the trying conditions of the school shop.

It is keyed for the work in the Elementary and Junior High School, the Senior High School or Vocational School, and a choice is mentioned on many items.

Send for the late edition of our catalog which shows our new tools. You should also have a copy of this index as a reference for making your Spring requisitions for tools as well as repair parts.

The Stanley Rule & Level Plant
Educational Department
New Britain, Conn.

STANLEY TOOLS

STANLEY EQUIPMENT IS STANDARD EQUIPMENT

The Stanley Rule & Level Plant
Educational Department, New Britain, Conn.

Gentlemen: Please send me
School Index of Stanley Tools
Stanley Tool Catalog No. 34

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For the Man with *Power* in his grip

The market is full of "toy" screw-drivers.

A man doesn't want a toy when he reaches for a screw-driver: whether to drive screws, or for any other of the thousand and one jobs a screw-driver is called on to do.

"Yankee" Plain Screw-drivers are made for the man who wants a tool that will stand punishment!

Handle of a "Yankee" cannot loosen, wobble or turn on blade. Every "Yankee" blade is tested twice by experts and won't twist, crack, break, or turn on the edge.

Well balanced with easy-grip handle, a "Yankee" Screw-driver works *with* a man and never against him.

No. 90. Standard Style—15 sizes: 1½" to 30" blades. Price for 6", 55¢; 8", 75¢. (Giant Sizes—24" and 30"—let a man reach in any place.)

No. 95. Cabinet Style—11 sizes: 2½" to 15½" blades. Price for 5½", 45¢; 7½", 60¢.

"YANKEE" *on the tool you buy means utmost in quality, efficiency and durability.*

WRITE us for "Yankee" Tool Book, free. Illustrated from photographs showing "Yankee" Tools in use: Ratchet Breast, Hand and Chain Drills; Automatic Bench Drills; Ratchet Tap Wrenches; Ratchet Braces; Spiral and Ratchet Screw-drivers; Removable-base Vises, etc.

North Bros. Mfg. Co., Phila., U. S. A.

"YANKEE" TOOLS
Make Better Mechanics

(Continued from Page 34a)

concept, and who can adapt themselves to the ever-changing character of industry. The vocational school of tomorrow must endeavor to study the child, discover his aptitudes, familiarize him with machinery and machine process, and give him practice in the use of tools and familiarity with mechanical arts along all possible lines.

Just now vocational education is groping in the dark. Educators who appeared to be on certain ground are wavering between two opinions. Some cling to the outgrown theory of the vocational education of 1920. Others are facing toward the new idea of developing adaptability. Industrial society has changed so greatly since 1920 that the theorists have not yet caught up. Schoolmen are not industrial economists; neither are industrial engineers educational authorities.

Educators as a class do not keep up with the evolution of industry. But such progress as has been made in education is due mostly to the efforts of the educator. It was the schoolman who invented the junior high school, which is to education what the automatic machine is to industry. The junior high school is the greatest of all contributions to the mechanics of education. After having established the system of testing and grading, the junior high school also has done much to develop the science of vocational guidance. By the use of these two systems, it is possible to select and cultivate minds with a fair and sympathetic understanding of their needs.

More than anything else, the work of vocational guidance disclosed aptitudes, talents, genius, precious qualities of which all normal minds have at least a spark. Where formerly inventors were discovered by accident, the junior high school now searches out the inventive mind and nurtures it to maturity.

I believe it to be the beginning of a new era for society when the educational and industrial leaders can join hands to consider the state of industry and education, and to establish a basis for an understanding between the two greatest factors in modern life. Industrial engineers will then learn how earnestly educators seek new light upon the subject of industrial education and the schoolmen will get a clearer view of the changing industrial order.

Oswego Normal Boys Hold Annual Dinner. The 29th annual get-together meeting of the Oswego Normal Boys was held recently at the Woodstock Hotel, New York City. Classes from 1892 to 1929 were represented at the meeting.

Following the dinner, the famous team of entertainers of the class of 1928 entertained with a number of clever songs and ditties. Mr. R. J. Petermann of the Brooklyn Technical High School welcomed the new boys and greeted the old members. He stressed the encouragement of the Oswego Spirit introduced by Alfred Wells Richardson of the class of 1879 and Arthur Sullivan Hoyt of the class of 1886.

Mr. H. L. Bretsch, a teacher in the New York City schools for over 30 years, described the organization 29 years ago, and urged the members to aid in the building of the Sheldon Hall Memorial Dormitory.

Mr. Hazen D. Chatfield, district superintendent of New York City, called attention to the prestige of Oswego, students being registered from all parts of the United States. He predicted that Sheldon Hall would attract more students, since there had been a decided trend toward vocational education at Oswego.

Mr. H. J. MacDonold of the New York Military Academy spoke on the growth of the organization as a means of perpetuating the "Oswego Spirit."

Mr. C. D. Hanford of the Stuyvesant High School, and Mr. E. D. Griswold of the same school, recalled their days at the Oswego training school and told what the training has meant to them in the vocational and technical field. Other members who spoke for their classes were: Mr. Sherman F. Worster, Mr. Bill Gordon, Mr. Bill Elliot, Mr. G. L. Whitcomb, Mr. Edward Forsythe, Mr. Nelson Hauer, Mr. Joe Donnenberg, Mr. Samuel Hammel, Brig. Young, Mr. Bill Zelenko, Mr. J. E. Moore, Mr. W. M. Davis, Mr. H. Failing, and Mr. Allen.

At the business meeting, the following officers were elected for the ensuing year: President, Mr. Robert J. Petermann; secretary, Mr. Clarence D. Hanford; assistant secretary, Mr. Harold J. MacDonold; treasurer, Mr. Homer L. Bretsch.

NOW, ARE THERE ANY QUESTIONS?

A Dark Finish for Walnut

864. Q.: I have a walnut radio console which I wish to furnish in a rich brown, not too dark. I have used water stains for walnut, but never seem to get the rich finish I desire. Could you tell me the name of a water stain for walnut, that would give a nut brown or golden brown color?

How should walnut burl overlay be finished?—*R. J.*

A.: Your failure to secure the rich finish you desire is probably caused by your method of treatment, as well as the materials you are using.

Apply water stain of a 3 or 4 oz. per gallon solution, let dry and sand with a split 6/0 sand paper. The work can then be high-lighted if it is desired, by saturating a small pad of clean cotton cloth and rubbing the corners of panels and moldings with the stain in such a manner as to make these darker than those parts where wear is likely to make them appear lighter. This may also be successfully done with a sprayer, in which case a small amount of denatured alcohol is added to the stain.

For the deep rich effect which you desire, a shading coat of color dissolved in lacquer, is now applied with a spray gun in commercial work, followed by a clear coat or two.

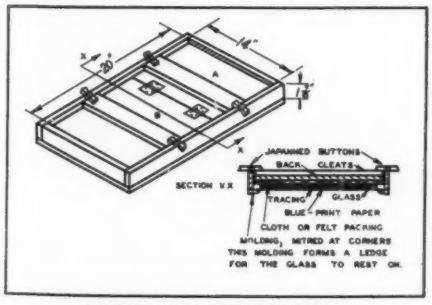
For varnish finishes, the first coat should be a coat of orange shellac reduced 3 parts of alcohol to 1 of shellac, brushed on with a soft bristle brush, dried hard, sanded with a split 6/0 finishing paper, dusted off and given a clear coat of good varnish. Let dry three days, sand with a split 6/0 paper, dust and tack off, following with a coat of either dark oak or walnut varnish stain as made by the same company supplying the clear varnish. Let dry hard, moss off the gloss lightly with No. 00 steel wool, dust and tack off, with a final clear coat of varnish following. Let dry hard and rub with crude oil, FFF pumice stone, and felt pad. When the rubbing is practically complete, make up a heavy cloth pad, dip in water, wring out; dip in the crude oil and then rerub the entire case. This method will give the good effects of both the oil and water rubbing methods with none of the disadvantages of either.

The use of a color coat between two clear coats gives a depth and tone to a panel which cannot be obtained in any other way.—*Ralph G. Waring.*

Blue-Printing Frames

868. Q.: I would like to know a method of producing blue prints in the school shop.—*A. M. G.*

A.: A very simple blue-print frame may be made in your woodworking shop. I have used one made according to the



SIMPLE BLUE-PRINT FRAME

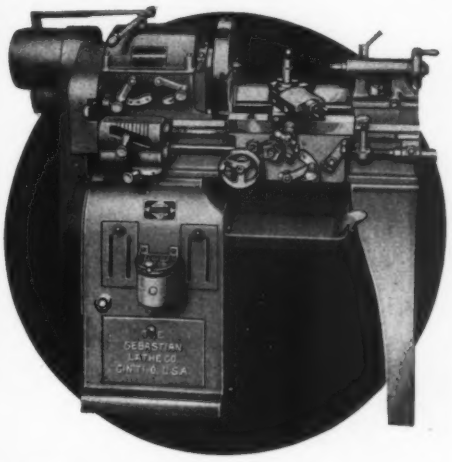
Recommended for Small Blue Prints Only

Part A of back is made shorter than part B. If blue print is to be inspected while in the process of being exposed to the sun, remove frame to a dark place, and open part A only. If inspection shows that blue print must receive further exposure, closing down part A of the back usually does not move the blue-print paper in respect to the tracing. If this should happen, however, a new blue print must be made.

(Continued on Page 42a)

Do This!

If you want absolute satisfaction for the money you spend for SCHOOL LATHES



Incorporate these specifications in your next request for bids—

(....) Lathes Gold Seal or equal—Swing 11", bed length 4', to be 8 speed geared head, full quick change box with no loose gears, to cut threads 3-96, feeds .007 to .156, all steel gears, 1 5/16" hole through spindle, collet capacity 7/8", bearings of main spindle 2 5/16x2¾—1 1/16x2¼", to be taper gibbed throughout, motor drive with motor fitted in leg under headstock with a tool cabinet in the leg below the motor compartment, tumbler yoke for cutting left-hand threads with the depth of the teeth already adjusted on the quadrant for throwing over to a left-hand thread, lathe to be bronze bushed wherever required. Macit tool post screw. Silent chain drive with easy adjustment for stretch in the chain, lathe to be fitted with a safety shearing pin, graduated compound rest and tailstock bases, tailstock center oiler, friction type collars on compound rest and cross feed with these collars graduated, accuracy alignment test .0005, motor and control to be (Specify here type current and type of control wanted). Each lathe to be furnished with a chip pan, depth thread chasing stop, centers, thread chasing dial, steady rest, and wrenches. The lathes shall all be furnished with all gears guarded by cast iron guards, and the operation of the lathe for stop and start shall be through a friction on the headstock controlled by a lever within easy reach of the operator so that the motor can run constantly when machine is in operation. The apron of the lathe shall have a safety device to prevent both longitudinal feeds being thrown in at the same time.

Add here list of extras wanted such as, Chucks, Taper Attachment, Draw-in Attachment, Collets, Tools, Dogs, etc.

THE SEBASTIAN LATHE CO.
CINCINNATI, OHIO
NEW YORK OFFICE—Room 372—50 Church St.

Irwins

Make your Job Easier

. . . Specify them

. . . they are standard . . . made with precision . . . never choke: cut clean holes through any wood.

Now . . . when you are giving your attention to the requisition covering equipment and supplies for the coming year . . . why complicate . . . confuse the selection of wood boring bits when there are Irwins?

Irwin wood boring bits . . . the product of nearly 50 years of doing just the one thing . . . doing it better and better all the time through three generations of wood working craftsmen.

Special charts for the Industrial Arts instructor are considered helpful by many. So is the booklet "How to Select, Use and Care for Bits." May we send them to you?

THE IRWIN AUGER BIT COMPANY
WILMINGTON, OHIO

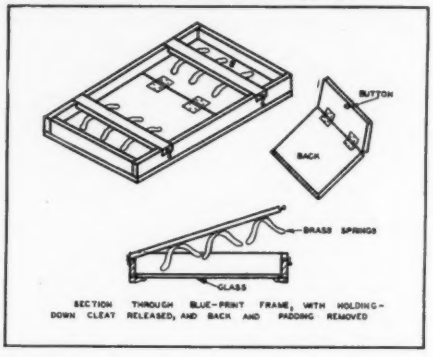
Sole manufacturers of the Genuine

The IRWIN Bit
Reg. U.S. Pat. Off.

(Continued from Page 41a)

sketch shown here, for several years in my classroom work. Originally I had made it for some work at home, and because I had no spring brass, I left off the springs and made it as simple as the drawing shows it to be.

The results, however, were quite good. If you want to make one a little more elaborate you might place the brass springs on the cleats which are used to hold down the back. A good packing with pieces of felt or wool cloth (as a matter of fact, I used heavy felt building paper) will press the tracing and blue-print paper close enough together for good results even without these brass springs.



For the best results, induce your school board to buy an electric blue-printing outfit for you. They're dandies and make your work much simpler.

Various Kinds of Woods

869. Q.: In thumbing through the pages of the December, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE, I notice that you are giving information as to where several particular kinds of lumbers may be obtained. Among those you list, I desire information on the following: Cottonwood, elm, hackberry, Norway pine, pecan, persimmon, sassafras, tamarack, and willow.—*G. B.*

A.: *Cottonwood:* Utley-Holloway Co., Chicago, Ill.; E. C. Artman Lumber Co., Metropolis, Ill.; Frank Paxton Lumber Co., Kansas City, Kans.; Chapman & Dewey Lumber Co., Memphis, Tenn.; and E. Sondheimer Co., Memphis, Tenn.

Elm: Bayou Land & Lumber Co., Neave Bldg., Cincinnati, Ohio; Fisher-Elmer Co., Ironton, Ohio; and Barr-Holaday Lumber Co., Louise, Miss.

Hackberry: Kansas City Hardwood Lumber Co., Kansas City, Mo.; and Hendrix Lumber Co., Mound City, Ill.

Norway Pine: Sawyer Goodman Co., Marinette, Wis.; and Guy Stevenson Co., Wellston, Ohio.

Pecan: North Vernon Lumber Mills, North Vernon, Ind.; J. W. Darling Lumber Co., Cincinnati, Ohio; and Barr-Holaday Lumber Co., Louise, Miss.

Persimmon: National Lumber Products Co., Chicago, Ill.; North Vernon Lumber Mills, North Vernon, Ind.; and Cornelius Lumber Co., St. Louis, Mo.

Sassafras: White River Land & Timber Co., Augusta, Ark.

Tamarack: Schmidt Bros. Co., Plummer, Idaho; Virginia & Rany Lake Co., Virginia, Minn.; Bowman-Hicks Lumber Co., Kansas City, Mo.; Foster Lumber Co., Lincoln, Nebr.; and Saari-Tully Lumber Co., Portland, Oreg.

Willow: North Vernon Lumber Mills, North Vernon, Ind.; Ashland Hardwood Lumber Co., Ashland, Ky.; Kansas City Hartwood Lumber Co., Kansas City, Mo.; J. W. Darling Lumber Co., Cincinnati, Ohio; and John T. Barnett Co., Xenia, Ohio.

Enameling Linoleum Floors

870. Q.: Can you tell me what to use in enameling a linoleum floor, or painting it so it will be deep rose in color?—*F. A.*

A.: Wash the floor thoroughly with a weak solution of Gold Dust, rinse with clean, warm water and let dry. Apply a coat of good "four hour" enamel and let dry over night. Apply a second coat the following morning, and let dry 48 hours, with heat. This will give a very satisfactory floor, which will need reenameling only at long intervals.—*Ralph G. Waring.*

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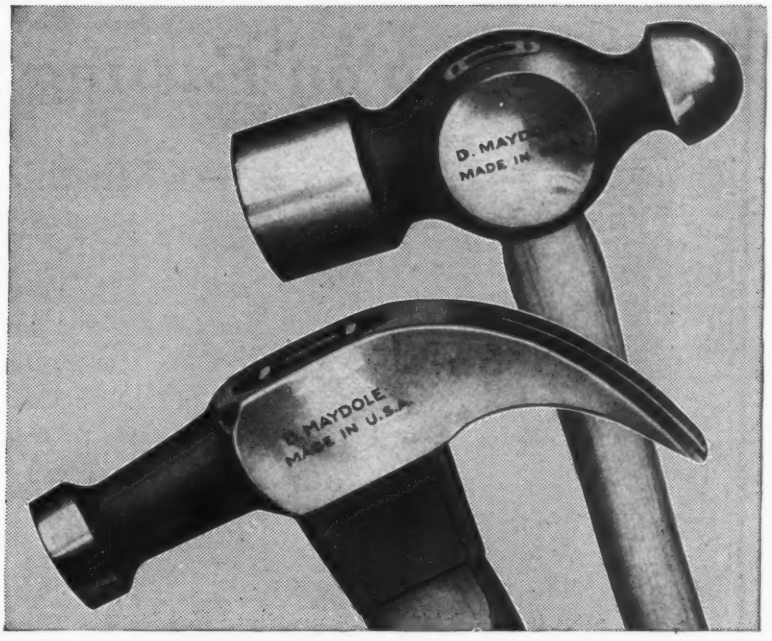


Maydole Hammers

best for the shop, best for budget

Built from finest materials possible to obtain, Maydole Hammers have balance, strength and a stubborn resistance to wear that makes them outlast two or more ordinary hammers for shop work.

Heads are *press-forged* from the highest grade tool steel, each end separately and carefully tempered; handles shaped to fit the hand from clear, second growth hickory that has been seasoned for years and put into the heads "for good".

Maydoles cost less to buy because they last longer. Your dealer can supply you with the styles and weights you need. Write us for a free supply of Pocket Handbooks 23 "H" containing valuable tables and information of use to your students.

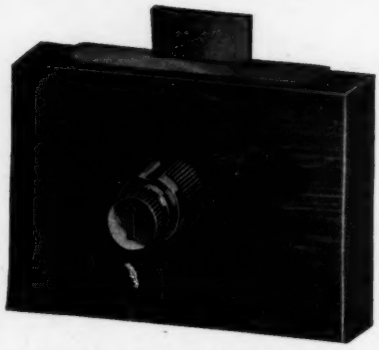
YOUR HAMMER SINCE 1843

Maydole Hammers

The David Maydole Hammer Co. - - - Norwich, New York

2784

Why Keep on Fussing With Keys?



Dudley K-1 Combination Cabinet Lock

Just the thing for Drawers and Cabinets

—when this Lock will solve your problem

No more keyboards—no keys to lose—no keys to forget—no more key expense—no master-key menace to fear. This new safe, pick-proof lock eliminates your whole key problem. It operates by touch—simply count the clicks and it opens in a jiffy—if you know the combination.

Sample sent to any school executive or instructor for free examination. Send for it today.

DUDLEY LOCK CORPORATION

Dept. A-55

26 North Franklin Street, Chicago

NEW PUBLICATIONS

Graining—Ancient and Modern

By William E. Wall. Cloth, 138 pages, 6 by 9¼, illustrated. Published by William E. Wall, Somerville, Mass.

This book with its many excellent color plates, should be of interest to the teacher of interior decorating. Graining is rapidly becoming a lost art and this book with its formulas and directions will do much to preserve it.

Objectives and Problems of Vocational Education

Edited by Edwin A. Lee, Ph.D. Cloth, 451 pages, 5½ by 8. Price, $3. Published by McGraw-Hill Book Company, New York City.

This book presents an interesting collection of monographs on vocational education, each written by a man who has been, or still is, prominent in the movement. The trends of the various types of educational endeavors which fall under the broad heading of vocational and industrial education, have been exceedingly well covered. The volume therefore contains much that is interesting and instructive to the student and teacher of vocational education.

Farm Mechanics

By A. M. Field, R. W. Olson, and V. E. Nylin. Cloth, 385 pages, 6 by 8½, illustrated. Price, $2.50. Published by The Century Co., New York City.

This volume is one of the Century Vocational Series, edited by Charles A. Prosser. It is designed as a textbook for agricultural students and will also be found very helpful by the farmer. It describes a great many different jobs which require the attention of the farmer and covers the usual run of repair jobs that arise on the farm. The nature of the repair jobs treated in this book cover primarily those that arise in the care of farm buildings, the maintenance of farm machinery, gas engines, storage batteries, etc., as well as problems arising in the heating, lighting, and supplying of water to the farm home and barns.

The Cosmopolitan Evening School

By John F. Friese. Cloth, 388 pages, 5 1/3 by 7¾, illustrated. Price, $3. Published by The Century Company, New York City.

The author of this book has performed quite a service to a great many administrators of evening schools in explaining in readable style the "why" and "how" of conducting an evening school. He discusses at length the method of organization, supervision, and administration of such schools, and touches upon the courses to be taught, the kind of teachers to obtain, the methods to be used in teaching, besides showing how to go about enrolling the students, what kind of forms to use, and how the school is to be advertised.

Drawing With Pen and Ink

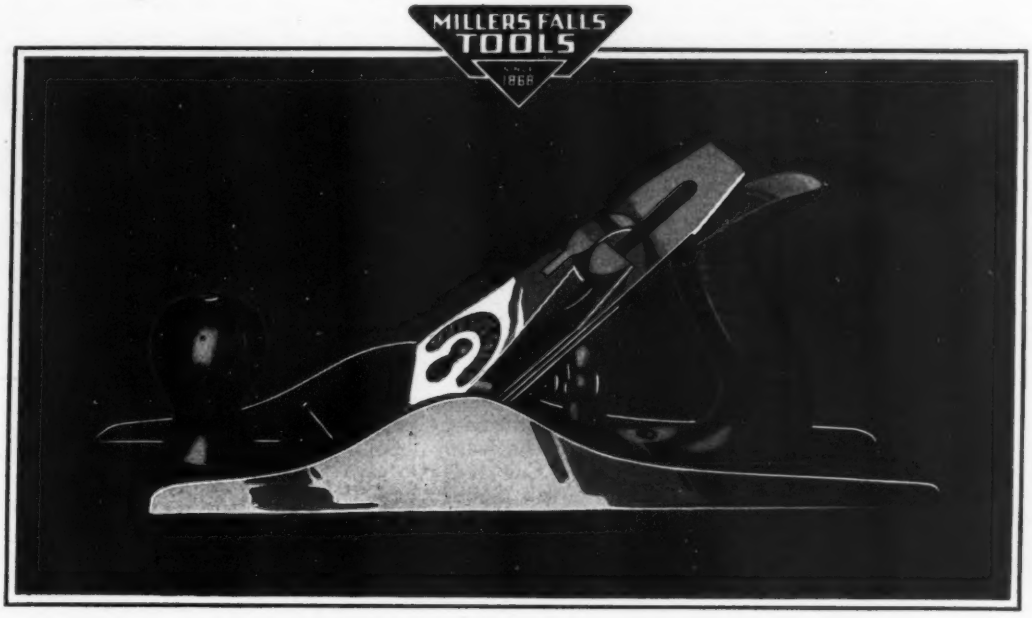
By Arthur L. Guptill. Cloth, 431 pages, 8⅞ by 11¾, illustrated. Price, $8.50. Published by The Pencil Points Press, New York City.

To the student, the artist, and the casual reader this volume will be a source of delight and information. It contains a wealth of illustrations which show a great variety of methods of using pen and ink. Examples of the work of able artists show every imaginable type of technique. Commencing with outline work, a study of light and shade, the use of plaster casts, live drawing, composition, the use of photographs, sketching, representation of trees, buildings, and architectural methods of rendering, interiors, and the combination of the pen and ink with other mediums, are all treated in this interesting book.

The price of the book, of course, takes it out of the realm of the textbook.

(Continued on Page 46a)

BORN - - - - March 1, 1929
of Distinguished Parentage



No. 9 Smooth—Length 9 in. Cutter—2 in. Weight 3¼ lbs.

A *Complete* Line *of* Planes *by* Millers Falls

HERE'S a brand new line of fine planes made by a manufacturer who's been at this business of making fine tools for half a century.

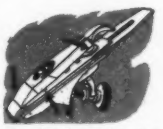
At first glance they look much like the planes you've known. It's after you use them that you note the difference.

Built Around the Cutting Edge

Millers Falls planes are built around just one feature, *the cutting edge.* Our engineers began with steel. Years of experience in selecting and electric - heat - treating of fine tool steels have resulted in refinements that make Millers Falls plane cutters last longer and hold a finer edge.

Other New Features

Next the designers tackled chattering. The precision with which the blade is held at the correct cutting angle, determines how well the plane does its work. So new features were added, such as 3-point bearing of lever cap, making possible hair breadth adjustment that holds and overcomes chatter.



Showing 3-point bearing

Made for Tool Users

Practical carpenters, cabinet makers, men who love good tools for home shop - work — anyone who uses a plane will delight in the balance, comfortable grip and smooth cutting efficiency of Millers Falls planes. Sizes in bench planes from 7 inches to 24 inches, smooth and corrugated bottoms, and 21 models of block planes, cover every plane need.

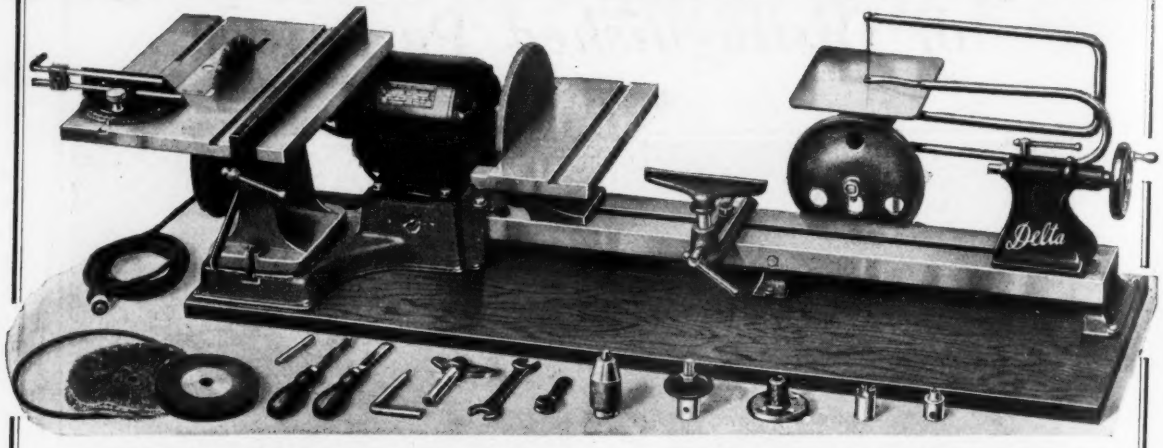
Sold by Responsible Dealers

Millers Falls planes will be found in the stores of leading hardware merchants. The mere fact that a dealer offers you Millers Falls is proof that he desires to sell you truly fine tools and so win your permanent patronage and good-will.

A new catalog for tool users is ready. Send today for free copy without obligation. It shows a wide variety for your choice in 14 major tool lines.

MILLERS FALLS CO. MILLERS FALLS, Massachusetts
NEW YORK: 28 Warren Street CHICAGO: 9 So. Clinton St.

DELTA'S NEW FEATURES



Increase Project Range

The 20 New Features incorporated in the 1929 Model DELTA Electric Handi-Shop put it far in the lead. The improved Miter Gauge, New Circular Saw Adjusting Lever, New Rip Gauge, Larger Triple Foundation Lathe Bed, ½ inch Capacity Drill Chuck, and Husky Motor are but a few of the outstanding improvements.

Use the Coupon NOW!

DELTA SPECIALTY CO., Dept. M-59
1661-67 Holton St., Milwaukee, Wis.

.....Please send, without obligation, FREE illustrated literature describing new 1929 Model Delta Handi-Shop.

.....Please send me a copy of "How to Make Things With a Workshop."

Name.....

Address.....

(Continued from Page 44a)

Standard Specification Outline for Building Construction

Paper, 57 pages. Published by the Associated Building Employers of Michigan, Grand Rapids. The specification outline offers a standard to be used by bidders in building construction work. The outline is intended to be used in connection with schedules listing types of floors, wall finish, types of windows, types of doors and trim, and other features.

The Coordination of Employers, Apprentimes, and Boards of Education

Paper, 12 pages. Issued by the department of vocational education, Albany, N. Y. Contains a description and illustrations of the various types of trade apprentice instruction offered in the evening classes for vocational apprentices.

Planning and Conducting Extension Campaigns. By H. W. Hochbaum. Circular No. 58, December, 1928, issued by the U. S. Department of Agriculture, Washington, D. C. An unbiased study of extension methods will show that much extension teaching is poorly planned and haphazardly carried out. If better methods of teaching are applied, far more people may be reached and influenced, and far more rapid progress may be made in meeting the large problems of farming and country life. The present booklet outlines plans for a well-organized, systematic plan for teaching many persons to make desired changes in practices. It outlines the basis of the campaign, the need and the solution, the planning of the campaign, and offers a number of suggestive outlines as models for the work.

Outline of Course for Elementary Printers. By W. Van Gasbeek. Published by the department of industrial education at the A. & M. College, Texas. The pamphlet provides a two-year course in printing, which is intended for pupils over 14 years of age who are physically and mentally capable of learning the trade. It may be used for beginners in the trade, as well as for an extension or part-time course for those working at the trade who want to supply some defect in their training for the work.

AMONG the INDUSTRIAL ARTS TEACHERS

Mr. George A. Peters, first assistant instructor in the machine shop of the Boys' Technical High School, Milwaukee, Wis., died at his home on March 2, following an attack of heart failure. Mr. Peters was the third oldest member on the school faculty, having entered the school as an instructor in 1908. He had taught for 21 years previous to coming to the technical high school.

Mr. William D. Mayo, formerly instructor in machine and architectural drawing at Davenport, Iowa, has accepted a similar position in the East High School at Des Moines. Mr. Mayo was an instructor in the Davenport high school for the past twelve years and his work in this particular line was most successful. The work of his students drew first prizes last year in the state-wide competitive exhibit, sponsored by the Iowa State College at Ames.

Mrs. Bertha Morrow, teacher of household economy in the Westinghouse High School, Pittsburgh, Pa., died recently at the West Penn hospital, as a result of burns received. Mrs. Morrow had been a member of the faculty of the high school for the past two years.

Mr. Charles A. Johnson, who has been elected director of vocational education at Houston, Tex., is engaged in organizing and developing the work in that city. **Mrs. Frances Sibley** has been elected instructor in related textiles, mathematics, and design, and **Mr. W. H. McKinney** as acting director of vocational work.

Mr. R. P. Oyler has been elected head of the vocational department in the consolidated schools of Covington, Ky., to succeed Mr. W. K. Moseley.

(Continued on Page 49a)

(Continued from Page 46a)

Mr. R. A. McGee, director of high-school industrial arts in the University High School, Minneapolis, Minn., will teach two teacher-training courses at the 1929 summer session of the University of Washington. These courses are: Analysis and Organization of Industrial-Arts Subjects, and Methods of Teaching Industrial Arts. These courses will be supplemented by several shop courses to be in charge of regular instructors of the engineering shops.

Mr. Lloyd B. Stayer, principal of the continuation school at Lancaster, Pa., has been given full charge of the cafeterias in the public schools. Mr. Stayer will continue as principal, but will be relieved of all teaching duties.

Miss Aida C. Bishop, formerly assistant principal of continuation schools in Pittsburgh, Pa., has been appointed principal, to succeed Anthony M. Goldberger. Miss Bishop holds a degree from the University of Pittsburgh and is well fitted by training and experience to carry on the work of continuation-school education in Pittsburgh.

Miss Ruth E. Welty has been appointed vocational counsellor in the Pittsburgh Continuation Schools.

Miss Mary J. Boyd has resigned her position as home-economics instructor in the Winnebago, Minn., schools to accept a position as home demonstration agent in Faribault county. Miss Boyd will make her headquarters at Blue Earth, Minn.

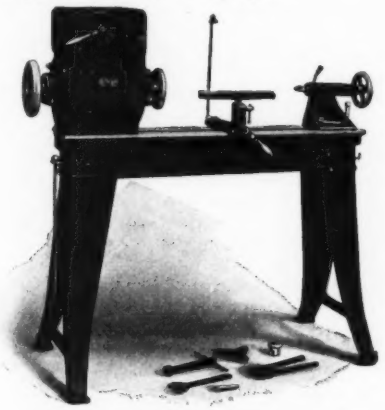
Mr. A. J. Lindeman and Mr. Archie O. Muehl have been reelected as members of the local board of industrial education at Milwaukee, Wis. Their term will expire December 31, 1930.

School Shop Equipment News

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

NEW OLIVER MOTOR HEADSTOCK SPEED LATHE

The Oliver Machinery Company of Grand Rapids, Mich., has just placed on the market a new Oliver unit-type motor headstock speed lathe, which for simplicity and ease of operation, concentrates the motor, its control, and its protective devices in the motor headstock. There is only one rotating part, and the spindle operation and speed are controlled by means of a push button and lever. A safety feature makes it impossible to start the motor, except at low speed. It can be stopped, however, at any speed.



The ½ h.p. motor is of the four-speed type, which has a control with all desirable protective devices built into its housing. The motor operates under full load at 600, 1200, 1800 and 3600 r.p.m. The rotor is mounted on a hollow spindle made of high carbon steel, which rotates on ball bearings, that take end thrusts in both directions, thus permitting turning between centers or using the outside face plate.

(Continued on Page 50a)

Materials For This Sewing Stand $2.25 PLUS POSTAGE

Fascinating to Make
A Joy to Use
Ideal as a Gift

This sewing basket, standing 29 inches high, with large, roomy, covered storage space on top and convenient open basket at the bottom. Can be easily made in your classes without any special equipment. A hammer, a pair of cutting pliers, and an awl are the only tools needed. Everything else necessary to assemble and weave this practical and good-looking sewing basket is furnished, including plenty of colored Art-Fibre Cord for weaving in any color combination desired—without extra charge. Make your choice of colors from the following and order today—Old Rose, Soft Blue, Blue, Emerald Green, Soft Green, Orange, Lemon Yellow, Lavender, Taupe, Black, Red, Walnut, Walnut Brown, and White. Shipping weight 10 pounds.

Use This Coupon and Mail Today

Grand Rapids Fibre Cord Co., 609 Myrtle St. N. W., Grand Rapids, Mich.
Send me materials for making Sewing Stand No. 79. I want.....
color for the weaving and.....color for the trimming.
Name.....
Address.....
.....

BLUE BOOK SERIES

Just off the Press

Vocational Texts on Many Subjects

Over one hundred handy volumes

Authoritative — Practical — Well Illustrated

THE instruction material in these new books represents the best that experts in their various subjects can produce. Each text has been carefully edited, the subject matter is free of ambiguous statements, and it gets down to the intelligence level of the pupils. Those who helped to produce the texts also teach from these same books.

Easy to Understand—Easy to Apply

A partial list of Blue Books, 5 x 7½

Auto Mechanics	12 Vols.
Auto Ignition	12 Vols.
Commercial	22 Vols.
Electrical	18 Vols.
Show Card Writing	4 Vols.
Sign Lettering	4 Vols.
Shop Practice (*seven divisions*)	
Blacksmithing and Forging	4 Vols.
Patternmaking	5 Vols.
Reading Shop Blueprints	2 Vols.
Welding, Gas and Electric	3 Vols.
Foundry	9 Vols.
Machine Shop	14 Vols.
Toolmaking	4 Vols.

Building Trades, 31 Vols. (ready April 1st)
Radio Library (5-Volume Set)
Building Estimators' Guide (10-Volume Set)

Each volume is well made and bound in blue Spanish Morocco leather. All of them are semi-flexible, fit nicely into the hand and are convenient to use.

Lists of Books and Prices sent on request

International Textbook Co.

INTERNATIONAL TEXTBOOK CO.
Box 8906-B, Scranton, Penna.
Please send me prices of your text on the following subjects:

_____

_____

_____

Name_____

Position_____

School_____

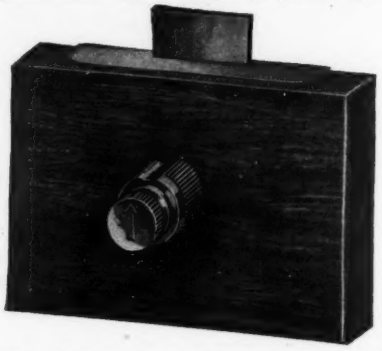
Address_____

(Continued from Page 49a)

The new unit type motor head permits the modernization of old speed lathes, changing them from belt-driven types to the motor-driven type, by merely replacing the old headstock. Similar combinations are possible for three-phase, two-phase, or single-phase electrical systems.

NEW DUDLEY COMBINATION LOCK FOR SCHOOLS

The Dudley Lock Corporation of Chicago, Ill., has announced the marketing of its new Dudley K-1 and B-2B combination locks for school purposes. The B-2B padlock is especially suited for school shops and laboratories and eliminates the necessity of using keys and keyboards. It is safe and pick-proof and may be easily and quickly opened.



The Dudley Company is equipped to furnish either type of lock in sets having the same combination.

A sample for examination will be sent free upon request by the Dudley Lock Corporation, 26 North Franklin St., Chicago, Ill.

NEW WOODWORKING MACHINERY CATALOG

The American Saw Mill Machinery Co., of Hackettstown, N. J., has issued its new catalog No. 28, devoted to sawmill and woodworking machinery. The catalog describes and illustrates a wide variety of woodworking machinery, including power-feed rip saws, cut-off saws, saw benches, portable variety woodworkers, handy saw tables, bench saws, tilting-table saw benches, dimension saws, universal saw benches, tilting arbor saw benches, bench and hand jointers, planers, lathes, band saws, circular resaws, drum and disc sanders, mortisers, spindle shapers and routers, knife grinders, and saw sharpeners.

The catalog devoted some space to practical helps for the operators, including suggestions for filing saws, and rules for calculating size and speed of pulleys, and directions for inserting saw teeth.

A copy of the catalog will be sent to any school shop instructor upon request.

ALGOMA COMPANY ADDS NEW PANEL TO STOCK LINE

The Algoma Panel Company of Algoma, Wis., has recently added basswood panels to its regular stock line of wood panels. The new panels come in the size 36 in. by 72 in., and in thicknesses of 3/16 in., ¼ in., and ⅜ in., and are offered at this time because of the increasing demand for material of this kind for coping-saw work.

NEW LOOSE-LEAF CLUTCH CATALOG

The Carlyle Johnson Machine Company of Manchester, Conn., has just issued a loose-leaf clutch catalog, showing several pages devoted to sizes, prices, and dimensions of Johnson friction clutches.

The company also issues separate catalogs for each industry, showing pages of various applications of the firm's clutches to different machines and problems in the particular industry. Among the divisions of the industry in which the Johnson clutch is used are screw machine operation, milling-machine operation, punching and shearing operations, drilling, and threading-machine operation.

(Continued on Page 52a)

Have you had a demonstration of the "JUNIOR" DeWALT?

Only $195.00 complete with motor, table, saw blade, safety guard, switch and connecting cord.

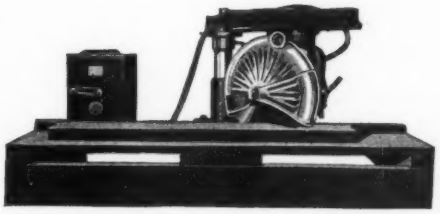
—an Ideal Woodworker for Student Training

To schools that need a lighter machine to supplement the heavier DeWalt and to those that have no need for the heavier machine, we now offer the "Junior" DeWalt.

The "Junior" does everything the regular DeWalt will do on material up to two inches thick. It handles every operation, from the simplest rip or cross-cut to the most complicated compound miter, with ease, speed, accuracy and safety. It is equally well adapted for elementary and for advanced training . . . and provides the most practical all-around course in woodworking.

At your convenience we'll gladly arrange for a complete and convincing demonstration of the "Junior" DeWalt in your school shop.

DeWalt Band Saw



Regular DeWalt—complete with table, guards and attachments

DeWalt Jointer

"JUNIOR" DeWALT *All Purpose* Wood Worker

DeWalt Products Corporation
705 New Holland Ave., Leola, Penna.

Please let me have complete particulars about the many advantages of the "Junior" DeWalt in our school shop.

Your Name.....

School Name.....

Address.....

There are 7 reasons why
DAKALITE Durable Dye-Stain
is most practical for school use

DAKALITE

1. DAKALITE is permanent to light.
2. The shades are attractive, and conform to the standards set by various standardizing agencies.
3. DAKALITE will not "lift" or "bleed" into any finish whether lacquer, shellac, wax or varnish.
4. DAKALITE Water Stains raise the grain less than any known water stains. This is the testimony of hundreds who have proven this.
5. DAKALITE is easy to apply, easy to modify after having been applied, and easy to clean from brushes, container and hands afterwards.
6. DAKALITE penetrates deeply, dying the cells and not painting or mudding the grain of the wood.
7. Reckoned on the quart basis, DAKALITE costs less than any high grade stain on the market. Spend this difference on better finishing coats and turn out superior work.

DAKALITE Durable Dye-Stains are water soluble powders made in twelve standard shades. Send 15 cents in stamps for enough powder to make a pint of the best stain you ever used.

CRACKLE FINISH

DAKALITE makes all the new lacquer finishes that are so popular now. The new crackle finish is very easy to apply. Send for the NEW Dakalite Manual and Catalog. It's free to instructors and supervisors.

The Complete Dakalite Line

Dye-Stain
Oil-Stain
Penetrating Stain
Weather-Kraft Stain
Fillers
Undercoats
Varnish-Stain
Lacquer
Varnish
Decalcomania
Enamel
Brushes
Spray Guns

SEE OUR DATA IN BRUCES SPECIFICATION ANNUAL 1929 EDITION

Dakalite Products Co., Inc.
13,000 Athens Ave., Cleveland, Ohio

(Continued from Page 50a)

The Carlyle Johnson Company will be glad to send a copy of any one of the catalogs to any school official or shop teacher who may be interested.

MR. ARMSTRONG BECOMES TREASURER OF JOSEPH DIXON COMPANY

Mr. Henry W. Armstrong has recently been elected as treasurer of the Joseph Dixon Crucible Company, Jersey City, N. J., succeeding the late Mr. William Koester.

Mr. Armstrong entered the employ of the Dixon Company in 1903 as an office boy, and gradually worked his way up until he was promoted to the sales department. In 1920 he was appointed as credit manager, and in 1926 became assistant treasurer.

NEW DEVRY MOTION-PICTURE FILMS FOR SCHOOLS

The DeVry Corporation of New York City has announced the merger of the Q. R. S. and the DeVry Motion Picture Company, with the removal of all the motion-picture activities to the DeVry plant, under the active management of Mr. H. A. DeVry and his associates.

The merger of these well-known and experienced companies will provide a most extensive line of motion-picture apparatus, which will include the entire range of motion-picture machinery from the least expensive movie camera to the highest-priced combination talking movie outfits for home and business.

NEWS AND NOTES

Announce U. S. Civil Service Examinations. The U. S. Civil Service Commission has announced open competitive examinations for the positions of associate and assistant social economist to be held on May 1, at Washington, D. C. The examinations are to fill vacancies in the children's bureau, the department of labor, and vacancies occurring in positions requiring similar qualifications. The salaries range from $3,200 to $3,700 per year for the associate position, and $2,600 to $3,100 for the assistant position.

Full information may be obtained from the U. S. Civil Service Commission, Washington, D. C., or from any post office or customhouse in any city.

Regional Conference at Portland, Oreg. A joint regional conference for agriculture, home economics, and trades and industries, for the Pacific Coast states, will be held during the week of May 20, at Portland, Oreg.

Central Regional Conference at Milwaukee, Wis. The twelfth annual central regional conference on trade and industrial education will be held April 23 to 26, at Milwaukee, Wis. Most of the meetings will be held at the Milwaukee Vocational School.

Offer Vocational Teacher-Training Courses. Teacher-training classes have been conducted at the El Paso, Tex., vocational school, under the direction of Mr. L. E. Williams, of the A. and M. College of Texas. Five units of 30 hours each were offered, including theory and principles of vocational education, job analysis, trade analysis, course making, and vocational guidance. A total of 47 teachers were enrolled in the course with credit given toward a Smith-Hughes certificate.

Congress Makes Additional Appropriation for Vocational Education. The George-Reed Law recently passed by Congress has made available a third of a million dollars of Federal funds for expenditures in vocational education extending over a period of five years.

Vocational Rehabilitation Work Provided in Texas. A bill now before the Texas legislature provides for the acceptance of the vocational rehabilitation law. The bill is being supported by State Supt. S. M. N. Marrs and by other educators of the state.

(Continued on Page 54a)

My instructor used to say . . .

"Camouflage is Subterfuge"

"The day I tried awkwardly to sandpaper out some tell-tale plane-marks on a piece of wood, I touched a somewhat vibrant chord in my instructor's bosom. I never tried it again.

" 'Camouflage is subterfuge,' was his laconic comment in all such cases. In finishing, particularly, all forms of camouflage were barred. Whereas a multitude of evils in workmanship might have been hidden beneath a smug coat of paint or lacquer, we were never allowed to use it.

" 'Do it right, down to the last touch of the plane! Then you won't *want* to cover it up. You'll be proud of it.' That was his admonition. And proud we were when the Johnson's Wood Dye was put on, bringing out the exquisite beauty of grain and texture, even in the cheaper woods. Glad we were, then, of our painstaking care. Opaque finishes were soon as enthusiastically tabooed as Johnson's Wood Dye was welcomed.

" 'Do a thing well so you won't have to camouflage, for camouflage is subterfuge.' That was the lesson we learned. And now, years later, its value is emphasized for us day after day in a hundred different ways."

S. C. JOHNSON & SON, "The Wood Finishing Authorities," RACINE, WIS.

FREE — TEXTBOOKS ON WOOD FINISHING

Every step in every finishing process is fully outlined in the new Johnson Textbook on Wood Finishing. Your work will be immensely simplified with these aids to instruction. Send today for sample copy and information on how to obtain a supply for your classes.

S. C. Johnson & Son, Dept. I.A.5, Racine, Wis.

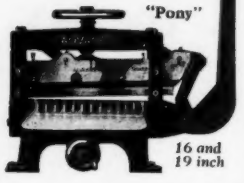
Gentlemen: Please send me sample copy of your Textbook on Wood Finishing and information on how I may obtain a supply for my classes. Please send also school price list on all of Johnson's Interior Finishes.

Name.....

School.....

City..... State.....

"Pony"



16 and 19 inch

Advance Cutters

Advance Lever Paper Cutters are made in four sizes, from the 16- and 19-inch "Pony," with or without iron stand, to the sturdy 26½- and 30½-inch sizes illustrated above.

Send today for full information regarding Advance Cutters and ask for literature describing any of the following machines and utilities used throughout the world in the Graphic Arts:

Diamond Power Paper Cutters
Lee Two-Revolution Cylinder Presses
Hoerner Combination Type-High Machine
Mercantile Addressing Machine
Sieber Adjustable Hand and Foot Punches
Challenge Proof Presses
McGreal Combination Printers' Chases
Challenge Labor-Saving Iron Furniture
Challenge Mammoth Iron Furniture
Challenge Notched Iron Furniture
Challenge Semi-Steel Imposing Surfaces
Challenge Pressed-Steel Galleys
Challenge Rigid-Rim Galleys
Challenge Iron Sectional Blocks and Hooks
Challenge Type-High Gauges
Challenge Quoins and Keys

ARE SOLD BY ALL LIVE DEALERS EVERYWHERE

The Challenge Machinery Co.

GRAND HAVEN, MICHIGAN

Chicago, 17-19 E. Austin Ave. **New York, 200 Hudson St.**

(Continued from Page 52a)

Summer Session at Winnetka, Ill. A six-week's summer session for teachers, supervisors, and superintendents will be held from June 17 to July 26 at Winnetka, Ill. Lectures, conferences, demonstrations and opportunities for practice teaching will give those who register for the course a good grounding in the philosophy and technique of the Winnetka school plan. There will be a seminar for principals, supervisors, and superintendents, or those preparing for such positions, dealing with the administration and supervision of schools adapted to individual differences. There will also be an opportunity for practice teaching in this summer school for a limited number of experienced teachers, principals, and supervisors.

Complete New Trade Course in Plumbing in Wisconsin. A state trade course in plumbing for apprentices in the trade has been established in the state of Wisconsin, as a result of the united efforts of the state board of vocational education, the state board of health, and itinerant plumbing instructors. The course is organized under the Smith-Hughes Law and aims to give apprentices instruction in the theoretical side of plumbing, water supply, and sewage disposal while learning the practical aspects of the trade. In connection with the plan, classes have been established at Green Bay, Appleton, Oshkosh, Fond du Lac, and other cities around Madison and along the Michigan lakeshore. Classes for plumbing apprentices are now conducted in sixteen vocational schools.

New Vocational Plan Adopted at Monessen, Pa. Under a new arrangement, the vocational course in the high school at Monessen, Pa., has been reduced from three to two years, with the result that students taking the vocational work will be able to spend the last two years of the course in preparation for the chosen field. Under the plan, senior students with 32 credits will be able to get positions in their chosen fields during the last semester, which eliminates the necessity of working outside for experience.

Begin Vocational Survey at Dallas, Tex. A survey of vocations in Dallas, Tex., is being made by a committee, of which Mr. A. W. Harris is chairman. The findings of the survey will be used by the vocational-guidance association in carrying on its program for the correlation of vocational-guidance activities in the schools.

Evening Vocational School Opened. Evening vocational classes have been conducted at El Paso, Tex., under the direction of Mr. M. Carasco, director of the Smelter Vocational School of El Paso. The subjects offered include machine-shop practice, welding, woodworking, needlecraft, and commercial work.

Vocational Classes in Texas. New classes in vocational work have been established since last September, in the towns of Athens, Brady, Baytown, Pearsall, Pittsburg, Runge, Schulenburg, Sour Lake, Waco, and Wellington. This is the first time that vocational work has been introduced in these communities. A total of nine cities have added new classes to their previous programs.

State Officials Approve Industrial Work at Gatesville, Tex. Following on inspection of the State Juvenile Training School at Gatesville, Tex., Dr. H. H. Harington of the state board of control, has commended the work of the institution. While the school has been in operation only a short time, the boys have shown an interest and have developed a skill which is worthy of commendation. It is planned to extend the scope of the work now being offered. Classes are conducted in both wood and metal work.

Extend Vocational Course at Corry, Pa. The vocational course at Corry, Pa., has been extended to include instruction during the twelfth or senior year. The expansion of the course makes it possible for eleventh-year pupils taking the course to obtain some part-time work of a practical nature in the industries of the city.

Plan Vocational School at Evanston, Ill. The school board of Evanston, Ill., has taken steps to establish a voca-

(Continued on Page 56a)

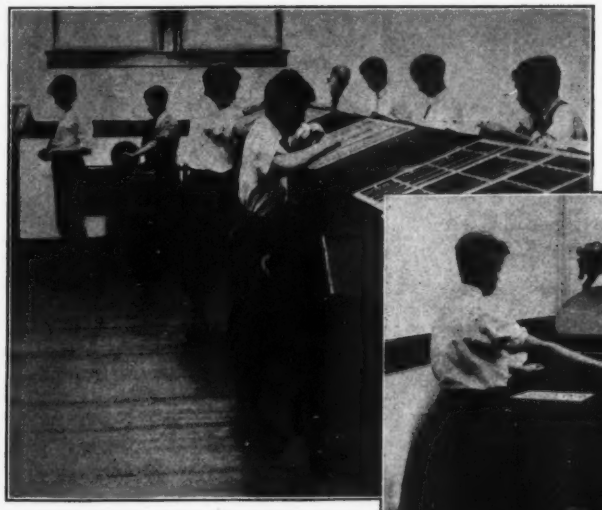
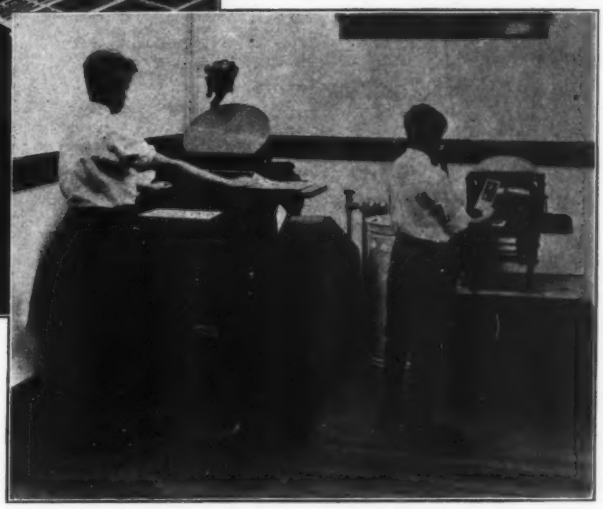


Illustration of Printshop
in HUBBARD GRADE SCHOOL
Plainfield, New Jersey

SEE OUR DATA IN BRUCE'S SPECIFICATION ANNUAL 1929 EDITION



The type cabinets in composing room shown above are the American School Type Cabinets No. 9178. Presses shown are Chandler & Price (New Series), size 10x15 in., and the Pilot Hand-lever Press, size 6½ x10 in.

The Social Significance of *Printing* in the Schools

AS a matter of co-operative aid in the school, printing is practically ideal. Almost every problem in the school printshop is a community project in which the pupils combine their efforts to produce for the benefit of the entire school. What better example of unselfishness can be imagined? What a contrast to those activities represented in the schools wherein the individual child is engaged in a project in which he only is interested.

The school-printed newspaper has almost unlimited possibilities in social values.

As the *Peabody Reflector* says:

"The knowledge and experience obtained from a school course in printing is of considerable value, not only to the many who enter some one of the many occupations of the printing trades, and to those who become editors, authors and publishers, but also to the much greater number who enter occupations which have much to do with printing in the way of advertising, issuing catalogues, stationery, office forms, blank work, house organs and other publicity work."

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8 Points of Superiority

Available to the trade *exclusively* through this important new Western States service:

1. **Lumpy gum is impossible by this method.**
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3. **Envelopes lie practically flat—less dishing or wrinkling.**
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5. **Larger, newly designed, flap enables you to print envelopes without the usual makeready.**
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THESE envelopes in No. 6¾ and No. 10 sizes in eleven regular paper stocks including bonds and krafts ready for immediate shipment at no advance over old prices. . . . Other sizes ready shortly.

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Also ask for Free Price List No. 30 listing twenty million envelopes (over 700 styles) ready for instant shipment.

The Western States Envelope Co. South Water *from* Clinton *to* Ferry Sts. Milwaukee Wisconsin

(Continued from Page 54a)

tional school for delinquent boys of the community. The need of a vocational school for this type of boys was indicated when it was reported that 300 boy delinquency cases were handled by the several organizations last year.

New Vocational School Planned at Stevens Point, Wis. Plans have been discussed for the erection of an addition to the high school to house the vocational department. The cost of the building is estimated at from $50,000 to $60,000.

High School at Palatine Has Manual-Training Equipment. The high school at Palatine, Ill., includes space for a fine manual-training department. The department has twelve double workbenches, a full set of tools, an electric band saw, an electric rip saw, an electric grinder, and an Oliver lathe.

Extend Course in Industrial Education. The board of education of Corry, Pa., has extended the course in industrial education, to include the twelfth grade and graduation. The twelfth year's work is carried out on a part-time cooperative arrangement.

Vocational Boys Complete Home. The boys of the vocational classes of the Deerfield-Shields High School at Highland Park, Ill., have completed a home in American and Old English architecture. The building was later sold for $16,000.

Will Erect Addition to Trade School. Construction work has begun on the foundry addition to the Cleveland Trade School at Cleveland, Ohio. Students taking work in the foundry will spend half of their time in the school and half in the foundry.

Vocational Courses at Tucson, Ariz. Trade classes in car repairing, sheet metal drawing, electricity, plumbing, and automotive mechanics have been established in the high school at Tucson, Ariz.

Propose Painting and Decorating Class in Akron, Ohio. A painting and decorating class as a part of the school course has been urged by Mr. E. J. Luthe, secretary of the Master Painters' Association, Akron, Ohio.

New Trade School in New York City. A trade school will be established in the Talmud Torah Building, New York City, as an occupational school for misfits in business and the professions. The school will be nonsectarian, open to adults of all ages, races, nationalities, and creeds, and will require a nominal tuition of those who attend. It has been revealed that the crowded professions are still the leading vocational choices of many, to the exclusion of the more manual trades, and it is the purpose to direct the surplus toward the industries which have experienced a shortage of available labor.

Aviation Courses Planned in California Schools. Regular aviation courses in the high schools and colleges of the state of California are planned in the near future in connection with a program initiated by the California Development Association and approved by the state education department. A state advisory committee of ten aviation leaders has been appointed to make a study of courses suitable for the eleventh and twelfth grades of the high schools and for the junior colleges in the state, to obtain technical information from the army and navy, and to secure the necessary equipment for the courses.

Trade School Will Erect Hut Buildings for California Hut. The boys of the Frank Wiggins Trade School at Los Angeles, Calif., have been given the task of erecting the new buildings for the California Hut, the chest agency for the sales of arts and crafts work of disabled war veterans. The work is being undertaken as an opportunity for the boys to gain actual experience in building.

Boys Design Airplanes for Contest in June. Approximately 6,000 boys in the public schools of Kansas City, Mo., have begun work on the construction of model aircraft to be entered in the miniature airplane contest, to be held on June 8, at Kansas City, under the auspices of the Kansas City Aviation Club. The airplanes will be constructed in the manual training shops as part of the regular classwork.